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Revision on the North American and West Indian Species of Cuscuta

REVISION OF THE NORTH AMERICAN AND WEST INDIAN SPECIES OF CUSCUTA

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I. Introduction.

Prefatory

It is now sixty years since the appearance of Engelmann's monograph of Cuscuta. This paper has served as the basis of our taxonomic knowledge of the dodders up to the present. Since Engelmann's time, however, great collections have been made in what was then practically unexplored territory and many new species have been found, a number of which have been described.

Inspection of the collections in different herbaria shows a great diversity of forms grouped under the same specific name, and the same form often classed under several different species. Also a great number of specimens show no attempt whatever at identification. This confusion is due, to a certain degree, to the fact that many of the distinguishing characters demand a microscopic examination before the species can be identified. This cannot be altered, and the botanist too busy to make dissections will probably never get beyond the guessing stage with many of the species. The different manuals and lists also show considerable confusion in the names applied to the different species and the range accredited to them. In attempting to make certain determinations it was frequently found that the plant in question could easily be called any one of two or three closely allied forms. Pictures had apparently never been made of many of the species.

It was with the hope of clearing up some of the confusion of nomenclature and descriptions and also to picture and present the North American and West Indian species in such a manner that they could be recognized clearly that the present work was undertaken. The characters used in the keys have been taken, in so far as practicable, from the exterior of the flower and ordinarily evi-

dent under the hand lens. The keys, however, owing to the necessity of employing only floral characteristics, leave much to be desired.

Fifty-three species are treated in this paper, five of them are introduced, four from Europe and one from South America. Twenty-five species are found in the United States, seven of which are also reported from Canada; thirty-three in Mexico and seven in the West Indies. Of the West Indian species, with the exception of one that enters sparingly from Brazil, all are North American. Fourteen are found both in the United States and Mexico. Of the fifty-three species and forty-one varieties which are accounted for here fourteen species and twelve varieties are described as new, and of the fifty-three species thirty-seven are now figured for the first time.

Acknowledgments.

I am especially indebted to Professor William Trelease for his invaluable advice and criticisms throughout the course of the work. It was at his suggestion and under his supervision that the problem was worked out. During the process of the work collections of dodders in various herbaria have been studied. The collection of the Missouri Botanical Garden was opened to the writer and was of great value inasmuch as it contains Engelmann's herbarium, including his types, and allowed comparisons nowhere else possible. Besides this the collections studied are those of:- University of California, Connecticut Experiment Station, Gray Herbarium, University of Illinois, New York Botanical Garden, United States National Museum, Rocky Mountain Herbarium in the University of Wyoming, and Yale University. At the Gray Herbarium and at the New York Botanical Garden, because of the limited amount of time at the writer's disposal, it was impossible to list all of the exsiccatae seen, though all specimens of Cuscuta were examined. The writer was granted the privilege

of borrowing a large number of specimens from the latter herbarium, however, for more detailed study. To the gentlemen in charge of all these collections I tender my sincere thanks and appreciation of their courtesy in allowing me the privilege of studying these materials, without which the work could not have been done adequately. I also wish to thank Mr. F. H. Hillman of the United States Department of Agriculture for the abundant specimens and samples of seeds which he generously provided. Thanks are also due Professor W. Dudgeon of Allahabad, India, for four photographs sent showing tree-infesting dodders; as well as to numerous friends who have kindly sent me specimens.

Historical.

Choisy (36) was the first, in 1841, to treat Cuscuta monographically. Previous to this time little attention had been given the group. A few new species had been described from time to time from different parts of the world by travelers such as Humboldt and Gay. Choisy's paper, well illustrated, included all the species then known, forty-one, a large number being newly described by him. He considered the group as a genus belonging with the Convolvulaceae and used characters of the stigmas to divide it into two sections. The first section included those species possessing acute or clavate stigmas and the second those with globose-capitate stigmas. The second section in turn was divided into two subsections on the basis of the inclusion or exsertion of the styles, a character which is now considered of doubtful value inasmuch as the styles show different lengths depending upon the stage of development.

Shortly after the appearance of Choisy's paper Engelmann (65), in 1842, published his Monography of the North American Cuscutineae. He treated the group as a tribe of the Convolvulaceae, dividing it

into two genera: (1) Cuscuta, with a gamosepalous 4-5 parted calyx and (2) Lepidanche, with 10-15 imbricated sepals. He described seven species of Cuscuta and one of Lepidanche, all of which he considered as new, but in a later paper he treated five of them as synonymous with previously described species.

In 1845 the ninth volume of deCandolle's Prodromus (37), in which the Convolvulaceae were treated by Choisy, made its appearance. Choisy here considered the dodders as a tribe of the Convolvulaceae and included forty-nine species. He included Engelmann's species, but considered most of them as doubtful or relegated them to synonymy.

Pfeiffer (200) in the meantime had become interested in the dodders coming under his attention and, later in 1845, published a revision of the group. He did not believe it to be subordinate to but rather coordinate as a family with the Convolvulaceae and so treated it. He divided the family into three genera on the basis of stigmatic characters, as follows: (1) Cuscuta, with linear stigmas, (2) Epilinella, with clavate stigmas, and (3) Engelmannia with capitate stigmas. The following year (201) he elaborated his original discussion and included Engelmann's genus Lepidanche.

Buchinger (32) in reviewing Pfeiffer's article showed that his Engelmannia is untenable because of previous occupancy and suggested the substitution of Pfeifferia. This too, however, had been previously used to designate a genus of the Cactaceae. As early as 1790 Loureiro in his Flora Cochinchinensis had established a monotypic genus which he called Grammica. This genus was apparently unknown to Pfeiffer and Buchinger. Later the species included in this genus was shown to be a member of the group of Cuscutas possessing capitate stigmas. It would appear proper, therefore, to

use the name Grammica to designate the members of any sub-group possessing similar characters, and Engelmann in a later paper uses it in this manner to designate those species with capitate stigmas.

Des Moulins (52) published his Études Organiques sur les Cuscutées in 1853. He, like Pfeiffer, considered the group as an independent family and divided it into two tribes using the character of the circumscission of the capsule as a basis for the division. He showed that it is possible to further divide these tribes into five genera on the basis of the characters of the seeds, the capsules or the styles. He decided to use the styles as showing the best differential characters and proposed the following arrangement:

Capsule circumscissile. Tribe Cuscuteae.

1. Styles filiform; seeds not winged- - - - - Cuscuta.
2. Styles clavate - - - - - - - - - - - - - - Epilinella.
3. Style single, capitate, ovoid - - - - - Monogynella.

Capsule not circumscissile. Tribe Cuscutineae.

4. Styles capitate, globular - - - - - - - - Cassutha.
5. Styles filiform; seeds winged- - - - - - Succuta.

Des Moulins carefully considered the morphological details of the plants, but was at an apparent disadvantage on account of the limited number of species, about fifteen, known to him.

Engelmann (70), in 1859, after over twenty years of study in this country and abroad, published his Systematic Arrangement of the Species of the Genus Cuscuta. He considered the whole group as belonging to one genus of the Convolvulaceae which he divided into three sub-groups or sections. The first, comprising those species with linear stigmas and distinct styles, he called Cuscuta; the second, those species with distinct styles and capitate stigmas, Grammica, and the third, those with the styles more or less united

and the stigmas of various shapes, Monogyna. These three groups he in turn divided into nine sections, including seventy-seven species, sixty-one varieties and four sub-varieties.

Engelmann had seen nearly all of the collections in the European and American herbaria and was able to relegate to synonymy a great many names that had been exercising botanists for many years. His ideas concerning the classification of these plants were well founded and, even in the light of present day knowledge, one finds it difficult to offer consistently any radical changes or improvements on his arrangement.

Material and Methods.

The work, the results of which are recorded here, was carried on at the University of Illinois during the years 1917 to 1919 inclusive. Some time was spent in the libraries at Washington, D.C. and in studying the materials in different herbaria.

The studies were all made from dried herbarium specimens. It is possible that fresh specimens will show some variation from the descriptions given because of shrinkage and alterations attendant upon drying, but this can scarcely be avoided. The specimens were prepared for study in one of two ways. They were either soaked in a lacto-phenol solution* which is admirable for bringing the structures back to near their normal shape, or boiled in water. In either case the flowers were placed in water for study to prevent the collapsing of the parts. The objection to the use of the lacto-phenol solution is that it is necessary to leave the materials in it for some time (usually at least 48 hours) before they are soft enough to dissect.

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* Lacto-phenol stock solution:- glycerine 40 parts; lactic acid 20 parts; phenol crystals 20 parts; water 20 parts.

This is not the case, of course, with boiling when they can be studied immediately. The corollas and calyces were split open and mounted on slides in glycerine jelly for study.

While the European species have been illustrated a number of times, our American forms in many instances have never been pictured. It is believed that the sketches included with the descriptions in the following pages will prove of value in making identifications. The types of most of the species treated have been studied and compared. All sketches were made with the aid of an Abbé camera lucida. All parts of the flowers are enlarged about five diameters with the exception of the scale drawn separately which is enlarged about ten diameters. The scales sketched on the open corollas were drawn from outlines and are not intended to be absolutely accurate in detail. The individual scale which is drawn separately for each species, however, was drawn to show the details as accurately as possible. Of course, the scales vary somewhat and this should be remembered when making comparisons. The drawings were made from what were considered as normal specimens for the species and all details that would be considered as aids for identification are included. The flowers photographed were selected to show a normal form and possibly supplement the sketches somewhat. The plate illustrating the seeds of some of the different species allows a comparison of their relative shapes and sizes. All photographs are of five diameter magnification.

The original publication and the principal monographs treating each species have been cited. Because of the scarcity of good illustrations it was thought best to include citations of practically all known American illustrations.

Morphology.

Seed.--Des Moulins in his Études was probably the first to use the characters of the seeds to differentiate groups of Cuscutas. He showed that it was possible to separate the genera on the differences in the shapes of their seeds. Different botanists have since studied the structure of the seed.

The number of seeds produced in each capsule varies from one to four, because of the abortion of one or more of the ovules. Certain species characteristically produce four seeds while others regularly produce but one or two. The shape of the seed is determined, to a certain degree, by the number developed in a capsule. When four are ripened they have two flattened surfaces and an outer convex surface. When but one is ripened, however, it generally possesses a spheroidal shape. The hilum is an oblong, linear or short, rounded, raised or sometimes sunken area situated towards one end or to the side of the seed. It is transverse, i.e. at right angles to the broadest diameter, or oblique. It is situated near the center of a roundish areola, the "umbilical area" of Engelmann and "seed scar" of Hillman (111), which is usually smoother and of a different shade of color and may be somewhat striated. A cross section shows the seed to possess four layers of cells enclosing the spirally coiled, filamentous, acotyledonous embryo in the albumen. The outer layer of cells having their exposed walls somewhat convex and cuticularized gives a roughened appearance to the seeds. Guttemberg (90) was able to show differences in the size and shape of the cells making up the testa and keyed out six species (C.suaveolens, arvensis, epilinum, trifolii, europaea and arabica.)

Stem.--The stems do not offer external characters sufficiently constant to aid in more than a general way in specific differen-

tiation. Within certain limits the size is of use, but they show wide variation, even on the same plant. In describing the stems of the different species it has been thought best to divide them with relation to their diameters into three categories using comparative terms to designate each of them. Sections of an average stem were measured for each species, but sections from other parts of the same plant will show wide variation. The size varies from .10 mm. up to 1 or 2 mm. The term "slender" is used in the descriptions to designate those stems that ordinarily possess diameters of not more than .35 or .40 mm., the term "medium" for those of about .40 to .60 mm., and "coarse" for those with a diameter greater than .60 mm. Combinations of two of these terms as "slender to medium" are used in cases where the size of the stem lies about the border line between two of the divisions, as well as qualifying adjectives like "very slender". At the best, the size of the stem is of small taxonomic value and undoubtedly varies with relation to the situation under which the parasite grows. It is a known fact that a plant of a certain species of Cuscuta growing on an unfavorable host, as some grass for example, will not have the same luxuriance of growth and consequent large diameter of stem as another plant of the same species growing on a more favorable host like an Impatiens. The internodal length varies within wide limits and is probably determined to a great extent by environmental factors such as the food supply and the distance to be traversed before being able to fasten onto another stem.

The internal structure, however, according to Mirande (170), exhibits characters which are of value. He was able to divide Cuscuta into three subdivisions by using characters of the vascular bundles. His histological division corresponds to that of Engel-

mann on external morphological characters. He finds that the Monogyna group shows bundle characters that, according to his opinion, are least modified by parasitism. The group Grammica, on the other hand, shows the greatest modification and reduction of parts, though Engelmann placed it intermediate, while the group Succuta, according to Mirande, holds an intermediate position. Further comparative study of the groups Succuta and Monogyna, which are predominatingly Old World species, may clear up the question regarding the sequence of forms.

Leaf.--The leaves of Cuscuta are reduced to scales which in themselves apparently offer no characters of taxonomic value. One usually subtends each branch and pedicel. They serve no apparent purpose, possessing but little if any chlorophyll and not functioning as photosynthetic organs. A few stomata are found on the scales of some species. Mirande has shown that the Monogyna group shows the least and the group Grammica the greatest amount of vascular reduction in the leaf.

Flower.--It is in the flower that we find the effects of the parasitic mode of life least apparent and obtain the best characters for the separation of the different groups and the differentiation of species. The proportion of one part to another, their relative shape, size, and positions assumed offer fairly constant differential characters. Owing to the small size of the flowers some of the characters are difficult to determine without the aid of a magnifier. The size of the flower ranges from about 1 millimeter in length for C. Harperi to 6 or 7 millimeters for the larger flowers, e.g. C. rostrata, corymbosa etc. The size varies slightly for different individuals of a species. Identification of some species as C. glomerata,

compacta, ceratophora etc. can be made fairly accurately on external characters without dissection, but others like C. californica, polygonorum etc. ordinarily require that a dissection be made to determine scale and stamineal characters. The texture of the floral parts shows all gradations from the more or less membranous to the thick, fleshy or even coriaceous types. In many species there are present in the calyx, corolla and capsular parts large pellucid or semi-pellucid glandular-appearing cells. The cells of the flowers in some species (C.indecora and Coryli) are lens shaped giving the flowers a verrucose or papillate appearance and in others (C. pentagona pubescens, gracillima saccharata etc.) these papillations are somewhat longer and give the flowers a pubescent appearance. The flowers are ordinarily pentamerous. Some species, however, are almost constantly tetramerous. Variations in the number of parts are found in nearly all the species, those characteristically pentamerous showing infrequently tetramerous or trimerous flowers. A number of species frequently produce flower buds endogenously. In the case of C. glomerata this mode of flower production predominates, the flowers breaking forth in two more or less continuous parallel rows which, because of the subsequent growth of the flowers, give this species its characteristic rope-like appearance.

Calyx.--The calyx is gamosepalous in the majority of the species and always persistent. A small number, however, have the calyx segments entirely free. The shape, texture, degree of separation, and overlapping of the segments are characters that are useful for specific differentiation.

Corolla.--The corolla is always gamopetalous, and usually tubular or campanulate frequently becoming urceolate as the fruit matures. The length of the corolla lobes in comparison with the

length of the tube; the shape of the tube and of the lobes; the position assumed by the lobes, that is, whether upright, spreading or reflexed; the texture of the corolla and the shape of the cells causing papillate forms; and the presence or absence of horn-like projections on the dorsal surface of the lobes are characters which aid in the separation of the species. In certain species the shape of the corolla is such that upon the maturation of the capsule the withered corolla is left at its base (C. pentagona); in others, because of its narrowness, it is torn loose from the base and carried either about the capsule (C. californica) or at its apex like a hood (C. Cephalanthi).

Scales.--Opposite the stamens and alternating with the lobes of the corolla are found a set of scale-like appendages in all but one of the North American species. The morphology and function of these organs are somewhat questionable. Babington (7) thought that they were inserted opposite the corolla lobes and had become joined opposite the stamens. He considered also that, as they alternate with the stamens, they should be considered as an inner whorl of modified stamens.

Engelmann (70) says:-"The most peculiar organs of the flower are the epistamineal scales, which are found in most of the species. The simplest form of that organ (in C. inflexa, C. chlorocarpa, etc.) exhibits a few teeth or lobes laterally adhering to the lower (attached) part of the filament. These lobes, in other species, expand into membranes, forming two lateral wings to the filament, crenulate or fringed at the tip and outside; then these wings partly unite at their upper end, thus forming a single bifid scale; finally they unite entirely, forming an oblong, ovate, spatulate or truncate, more or less crenate or fimbriate scale. Towards the base the

scales are always 'adnate in the middle,' or, properly speaking, attached to both sides of the adnate filament. Their bases usually connect with one another, forming inverted arches....These scales are evidently dilatations of the lower (attached) part of the filaments, perhaps of the character of stipules, as Prof. A. Braun suggests; or they are a sort of stamineal crown, attached at base to the corolla, but not a duplication of the same."

Miss Cunningham's (44)idea regarding the origin of the scales does not agree with Engelmann's. She states:- "it was noticed that in some species the filament of the stamen extends under the apex of the scale, in others the base of the filament can be traced nearly to the base of the corolla, while the scale forms two lateral wings, one on either side of the filament. For this work specimens from each of the three groups were examined. Longitudinal sections were made through the corolla with its attached stamen and scale and a careful study showed that the scales have their origin from the corolla. The stamens also originate from the corolla, but at a different level from the scale so that they cannot possibly be attached to each other. However, in the third section a few species showed some connection between the scale and the filament; but, while there may have been a slight attachment of these parts in individual specimens, yet the examination of other sections fully demonstrated the fact that the origin of the scale is unquestionably from the corolla, and the base of the stamen is slightly above that of the scale. The results of these examinations, so far as made, confirm us in the belief that the scales are not epistamineal, and do not form a stamineal crown, but are petaloid and are in the nature of a duplication of the petals."

It would appear inconsistant with the morphology of a typical flower to consider the scales as outgrowths of the corolla and at the same time originating opposite the stamens. After examination of a great many specimens of different species and of sections made of many of them, it is quite evident to me that the scales are outgrowths of the corolla, as Miss Cunningham believed, but not originating opposite to but rather alternating with the stamens, as Babington believed. They apparently begin at the base of the corolla opposite the lobes, and extend along the stamen attachment as a ridge or fold forming the "inverted arch" or bridge, as I shall call the region between the stamens. This stage is illustrated with C. californica. This proliferation further produces prolongations of the cells and we have the type represented in the case of Coryli. By the further growth and the union of the two wings by the continuation of the proliferation across the apex of the scale they become more or less free at the apex. A discovery made in a specimen of C. Pringlei lends color to this statement. In this species was found one flower in which there was formed on the outside of the corolla and corresponding in position to an inner scale, a perfectly formed winged scale. It would seem, therefore, that the scales originate as outgrowths of the corolla. The scales are considered in the descriptions as continuing to the base of the corolla in all cases and the description of the height of the bridge is in relation to their total length. The bridge is of different heights and fairly characteristic for the different species. The shape, size and texture of the scales and the length and abundance of their processes is very different in the various species. The different forms are fairly constant, and, within certain limits, offer good differential characters.

Their function is somewhat doubtful. Knuth (135) says:- "In den weisslichen oder rötlichen, meist fünf-, aber auch vier-, drei- und zweizähligen Blüten wird der Honig durch fünf und weniger sich über dem Fruchtknoten zusammenbiegende Schuppen gegen Regen geschützt.". Whether they serve any function other than this one of protection is rather doubtful.

Stamens.--The stamens are inserted at the top of the corolla tube. In some species (C. exaltata, Coryli etc.) the union of the filament to the tube below its separation is more or less evident, but in most of them it is not readily noticeable. The anthers range in shape from oblong-linear to orbicular, the shape being fairly characteristic for each species. They are introrse, adnate or more or less versatile, and open longitudinally. The pollen sacs are more or less divergent at their base in some species giving the anthers a sagittate appearance. In C. polygonorum and glandulosa the pollen sacs are frequently widely separated by a connective that reaches to the apex of the anther. This connective has been found somewhat prolonged into a slight apiculation in some specimens of C. americana and others. The filaments are slender or subulate, and somewhat oval in cross section. Their length shows a rather wide range. In some the anthers are quite sessile while in at least one species (C. gracillima) they are on filaments that are longer than the corolla lobes. This length of the filaments, however, is variable within certain limits for members of the same species.

Ovary and capsule.--The two-celled, four-ovuled ovary is ordinarily very small but even in the younger flowers gives an indication of the shape of the capsule-to-be. The placentas are subbasal and the ovules anatropous and provided with one integument.

The styles are of different lengths and shapes for the different species. They are for the majority of the species as long as or longer than the ovary. In most of the species they are slender and of the same thickness throughout, but a number, chiefly Mexican, possess styles having a greater diameter at the base and tapering towards the stigma. The common position for the styles is upright, but in some species (C. Coryli, polygonorum, mitraeformis etc.) they become widely divergent as the fruit matures. In the group Monogyna the styles are united more or less completely; in the others they are entirely separated. The only representative of the Monogyna section found in this country so far is C. exaltata. Its styles, while more or less connate, are easily separable and show a distinct line of cleavage, indicating that the union is apparently incomplete.

Two distinct types of stigmas are found. The North American forms all possess the semi-globular capitate type which characterizes the group Grammica, with the exception of C. exaltata which has the capitate type but with the stigmas somewhat flattened. One or two species show stigmas somewhat irregular and convoluted. All the species found so far in this country with the linear type of stigmas are Old World forms that are parasitic on economic plants. C. europaea has been found but three times in this country according to the records, and its apparent scarcity is probably because of the fact that it does not ordinarily parasitise crop plants and is unable to gain a foothold. The stigmatic characters are easily seen without dissections and are the most constant to be found in the flowers. These, with certain other characters, in correspondence with geographic distribution, seem to indicate the natural division of the group into its primary subdivisions.

The two carpels making up the capsule are not completely united in all the species. An opening extends down between the styles into the capsule in the most of them, but not, however, connecting with the interior of the cells. The size and depth of this opening, which Engelmann termed the "intrastylar aperture", is somewhat different for the various species.

The capsule may or may not be circumscissile, depending upon the species. The Old World forms, as well as most of those from Mexico and the southwestern part of the United States, have capsules that open by a more or less regular line of cleavage towards the base. In some species a thickened ridge is formed which marks this line of separation. Most of the species, however, do not show this thickening, and, while the cleavage is ordinarily quite regular, in some species it is somewhat ragged. The partition wall composed of the union of the adjacent walls of the two carpels up to the place where the intrastylar aperture begins is frequently left in the basal portion of the circumscissile capsule after opening. This is usually obcordate and is most admirably exhibited in C. applanata and epilinum. It may be somewhat difficult to predict the mode of dehiscence when examining young flowers, but with those with more mature capsules a slight pressure with the point of a pencil will usually cause the circumscissile type of capsule to break loose, while the non-circumscissile type will be crushed or will tear irregularly. In a careful dissection of young flowers of those species possessing a circumscissile type of capsule the ovary may often be detached if pulled, since the base ordinarily forcasts the line of circumscission of the mature capsule in having a weaker zone. The shape of the capsule is characteristic for the different species. It ranges from globose-depressed (C. polygonorum, umbellata etc.) to globose-ovoid

(C. salina, denticulata etc.) or pointed (C. Gronovii) or long beaked, flask-shaped (C. rostrata). This variation in shape is due in some species to a thickening of the capsule wall at the apex (C. Gronovii) but in others (C. denticulata) this is not true. Many species have the capsular wall thickened in the form of a ring or collar about the style bases and bordering the intrastylar aperture.

Pollination.--Kuhn (145) lists Cuscuta as one of a number of different "plantae floribus cleistogamis". Müller (178) says of C. epithymum that it is homogamous and "honey is secreted by the lower part of the ovary and is sheltered by the scale-like appendages of the corolla. The flowers are visited by Sphegidae and in the absence of insects fertilize themselves." Knuth (135) says:- "Die Staubfäden sind von Anfang an einwärts gekrümt, sie neigen sich später weiter nach innen, entweder bis zur Berührung mit der Narbe oder bis sie senkrecht über derselben stehen, so dass alsdann durch Pollenfall Bestäubung eintritt." and further: "Als Besucher bemerkte H. Müller 2 Grabwespen: Crabo elongatulus, einzeln, Philanthus triangulum mehrfach; Kohl in Tirol die Faltenwespe Polistes gallica."

Extended observations of a number of patches of dodder failed to reveal any insects visiting the flowers, though several butterflies were seen to fly close to the plants but without alighting. Mirande (170) says:- "Le Cuscuta fragrans qu'on trouve aux environs d'Athènes répand un agréable parfum de violettes; le C. reflexa de l'Inde, possède une odeur de fleurs d'oranger." A specimen of C. racemosa chiliana collected by Davis in California was recorded as "fragrant". It is probable that the plants exhibiting fragrance would be more liable to insect visits than those without it.

Secondary parasitism.--Cuscuta frequently is self parasitic, that is, often coiling about and sending haustoria into its own stems. Saccardo records Dendryphium MacOwanianum as parasitizing C. cassythoides and Peck (192) records a new species of Protomyces (P. Martindalii) as occurring on C. Gronovii. A number of swollen stems and flower pedicels found during the course of the study with cavities in them were indicative of galls caused by insects. It

was not possible, however, to identify the insects causing the galls.

Host specialization.--Engelmann (67) makes the following statement:- "I am now convinced that although many Cuscutae prefer some plants to others, yet there is no constancy in this respect, but the same species often grows upon a great variety of widely different plants. I did wrong, therefore, to name them from the genera upon which they grew and I should much prefer to see the names of C. Cephalanthi changed into C. tenuiflora, C. Coryli into C. incurva, C. Saururi into C. umbrosa Beyr.? C. polygonorum into C. chlorocarpa and Lepidanche compositarum into L. squarrosa if they had not yet been published." Later he actually did make some of the substitutions mentioned. It is a fact that certain species apparently have a preference for certain host plants, but, as Engelman indicates, this is not a constant characteristic. Some species live predominantly, however, on certain classes of plants as, for example C. exaltata whic is ordinarily found on trees, while C. salina shows a predilection for saline herbs, and so on. The majority prefer, however, the more succulent herbaceous plants.

Geographical distribution.--Except for a few species parasitic on economic plants and liable to distribution by artificial means and a few species with a wide variety of forms they seem to be more or less limited in their distribution. There seem to have been originally two points of dispersal in North America. One was apparently somewhere in the eastern part of the United States, probably somewhere along the Applachian range and the other in the southwestern part of the continent, either in Mexico or the southwestern United States. The species inhabiting the different regions possess group characteristics that are fairly typical of those regions. The species in the West Indies seem to be migrants from the United States and Mexico with the exception of C. partita which probably entered from Brazil; no species found in the islands so far is

peculiar to them, but all are members of more or less predominant continental species.

Owing to the nature of their structure, fossil remains, so far as recorded, are lacking and an estimate as to the age of the plants in relation to the earth's history would be valueless.

II. Systematic arrangement of the genus.

Cuscuta (Tourn.) L.

Cuscuta Tournefort, Inst. Rei Herb. 1:652. t.422. 1700.--Linnaeus, Sp. Pl. 124. 1753.--Choisy, Mém. Soc. Phys. et Hist. Nat. Genève 9:268. 1841; and in DC., Prodromus 9:452. 1845.--Engelmann, Trans. Acad. Sci. St. Louis 1:453. 1859.--Bentham & Hooker, Gen. Pl. 2:881. 1873.

Epithymum (Plinius ex)Nieuwland & Lunell, Amer. Mid. Nat. 4:511.1916.

Hypogynous sympetalous herbaceous parasites. Stems filiform, twining about woody or herbaceous hosts from which they obtain their nourishment by means of haustoria. Leaves reduced to small functionless scales. Flowers small, more or less cymose clustered, mostly gamosepalous; usually pentamerous (infrequently tri- or tetramerous); stamens inserted in the throat, alternating with the corolla lobes; scale-like, more or less fringed or fimbriate structures present in most of the species at the base of the corolla opposite the stamens; ovary two-celled, each cell containing two anatropous ovules; s tyles distinct or united; stigmas capitate or linear-elongated. Fruit a capsule which remains closed or opens with a distinct line of circumscission near its base; embryo acotyledonous, filiform or with an enlargement at one end.

Key to the subgenera.

Styles more or less united - - - - - - - - - - - - - - - - - - Monogyna.
Styles distinct.
Stigmas linear-elongated - - - - - - - - - - - - - - - -Succuta.
Stigmas capitate - Grammica.

Sub-genus Monogyna Engelmann.

Cuscuta group Monogyna Engelmann, Trans. Acad. Sci. St. Louis 1:460. 1859.

Kadurias Rafinesque, Fl. Tellur. 4:91. 1836.

Aplostylis Rafinesque, ibid. 91. 1836.

Stems very coarse. Flowers sessile or on short pedicels in spicate, racemose or paniculate cymes, pentamerous, the withered corolla remaining at the apex of the regularly circumscissile capsule or dropping off; styles thick, more or less completely united; stigmas capitate, subglobose to ovate or conic. Chiefly parasitic on woody hosts. Mostly Old World species, only one being found in North America.

Section Monogynella (Des M.) Engelmann.

Cuscuta section Monogynella (Des M.) Engelmann, Trans. Acad. Sci. St. Louis 1:512. 1859.

Monogynella Des Moulins, Études 0rg. cusc. 65. 1853.

Flowers in spicate or racemose cymes; stigmas capitate, subglobose or ovate, on thick, more or less completely united styles; withered corolla always remaining at the apex of the capsule.

1. Cuscuta exaltata Engelmann.

C. exaltata Engelmann, Trans. Acad. Sci. St. Louis 1:513. 1859.

C. gamostyla Engelmann, ibid. in synon.

Stems thick and stout (1-2 mm.). Flowers glabrous. 4-5 mm. long, pentamerous, sessile or subsessile in spicate panicles; calyx lobes fleshy, thick, concave, ovate-orbicular, obtuse, overlapping, nearly or quite as long as the corolla tube, subtended by one or two smaller concave bracts; corolla tube cylindrical with only the lobes exserted; lobes ovate-orbicular, obtuse, overlapping; stamens included, sessile; anthers ovate; scales composed of two wings, one

on either side of the filament attachment, bridged at about the middle, toothed along the upper portion, or in some specimens the two wings united and free forming the ordinary type of scale; ovary globose; styles equal, partially or completely united but separating easily when pulled; stigmas flattened. Capsule ovate-globose, circumscissile, 5-7 mm. long, carrying the withered corolla at the apex; seeds about 3-3.5 mm. long, somewhat rostrate and triangular; hilum oblong, oblique to transverse.

This species is the only one found so far in North America possessing united styles. It is commonly parasitic on trees, frequently on Quercus.

Type location:- In Western Texas. Range:- Texas and Florida.

Specimens examined:- Texas: New Braunfels (Lindheimer 472, taken as type, in the Engelmann herb.); on the Cibolo near San Antonio (Lindheimer in 1846); at the mouth of Pecos (Bigelow in 1851); Dallas Co. (Reverchon 663; 2552; in 1875 and in 1880); on the Blanco (Wright in 1847); Western Texas (Neally 260): Florida: Volusia Co. (Baker in 1918). This specimen, in the Gray Herbarium, so far as can be determined is identical with those collected in Texas.

Sub-genus Succuta (Des M.) n.comb.

Cuscuta group Cuscuta Engelmann, Trans. Acad. Sci. St. Louis 1:459. 1859.

Schrebera Linnaeus, Sp. Pl. 2 ed. 1662. 1763.

Cassytha (Gesner. ex) S.F.Gray, Nat. Arr. Brit. Pl. 2:345. 1821.

Lepimes Rafinesque Fl. Tellur. 4:91. 1836.

Cuscuta Pfeiffer, Bot. Ztg. 3:673. 1845.

Epilinella Pfeiffer, ibid. 673. 1845.

Epithymum Opiz, Seznam 40. 1852.

Succuta Des Moulins, Études org. cusc. 74. 1853. amplified.

Flowers sessile or pedicellate; styles equal, distinct; stigmas linear-elongated; capsule circumscissile or remaining closed. Natives of the Old World. Four species have been introduced into North America as parasites of cultivated crops.

Section Eucuscuta Engelmann.

Cuscuta section Eucuscuta Engelmann, Trans. Acad. Sci. St. Louis
1:460. 1859.

Styles as thick as or thicker than and slightly shorter than or exceeding the length of the elongated stigmas. Capsule circumscissile.

Key to the species.

Styles, including the stigmas, exceeding the length of the ovary.
  Calyx lobes triangular-ovate, acute, scarcely overlapping - 2. C. Epithymum
  Calyx lobes broadly ovate, somewhat fleshy pointed at the apex, overlapping - - - - - - - - - - - - - - - - - - - 3. C. planiflora
Styles, including the stigmas, not exceeding the length of the ovary.
  Flowers usually tetramerous, capsule pointed, calyx lobes not overlapping - - - - - - - - - - - - - - - - - - - 4. C. europaea
  Flowers usually pentamerous, capsule depressed, calyx lobes overlapping - - - - - - - - - - - - - - - - - - - 5. C. Epilinum

2. Cuscuta Epithymum Murray.

C. Epithymum Murray, Linn. Syst. 13 ed. 140. 1774.---Engelmann, Trans Acad. Sci. St. Louis 1:461. 1859.---Hillman, Nev. Agr. Exp. Sta. Bull. n.15. f.3. 1892.---Piper, Wash. Agr. Exp. Sta. Bull. n.8. f.1. 1893.---Matthew, Bull. Torr. Bot. Club 20. pl.164. f.2. 1893.---Toumey, Ariz. Agr. Exp. Sta. Bull. n.22. f.9. 1897.---Britton & Brown, Illustr. Flora 3:27. f.2956. 1898; 2 ed. 3:49. f.3443. 1913. No American synonymy. For European synonymy see Engelmann l.c. 461.

Stems slender, sometimes reddish or purplish. Flowers about 3 mm. long, pentamerous, sessile and numerous in dense compact clusters; calyx as long as or shorter than the corolla tube, the lobes triangular, acute, sometimes purplish tipped; corolla campanulate; lobes triangular, acute, spreading, shorter than the tube; scales more or less spatulate, shorter than the tube, fringed about the upper part, bridged at about a third of their height; stamens shorter than the lobes; filaments longer than the oval anthers; ovary globose, with a slightly thickened apex; styles and stigmas about twice as long as the ovary; stigmas filiform, slightly longer than the style. Capsule globose, circumscissile, capped by the withered corolla; seeds about 1 mm. long, rather rough, angled, compressed, ovate, usually four in a capsule; hilum short, oblong, transverse.

Type locality:- Europe. Range:- Throughout North America on leguminous crops.

Specimens examined:- Massachusetts: North Worcester (Lowe in 1916); Nantucket (Moore in 1918): Connecticut: Hartford (Bissell 1900; Parlin 875); Southington (Bissell 47; 78): Vermont: Manchester (Day 409): New York: LeRoy (Hill 68-1909): Pennsylvania: Bethlehem (Bechdolt in 1889); Newcastle (Johnston in 1904): Maryland: Baltimore Co.(Schurtz in 1907): Michigan: Memphis (Ward); Shelby (Wear): Missouri: (Martin in 1889); Cassidy (Davis 561): Washington: Seattle (Piper): Mexico: State of Mexico (Pringle 8514); Coahuila, Saltillo (Hitchcock in 1910).

3. Cuscuta planiflora Tenore.

C. planiflora Tenore, Fl. Nap. 3:250. 1824-1829.---Engelmann, Trans. Acad. Sci. St. Louis 1:464. 1859.

C. gracilis Rydberg, Bull. Torr. Bot. Club 28:501. 1901.

C. Anthemi Nelson, Bot. Gaz. 37:277. 1904.

For the Old World synonymy see Engelmann, l.c. 464. Our form appears to be the same as C. planiflora approximata Engelmann, but in the absence of sufficient foreign materials for study this cannot be stated for a fact.

Stems slender. Flowers glabrous, about 2 mm. long, membranaceous or somewhat fleshy, white, sessile, in dense globular clusters; calyx lobes as long as the corolla, broadly ovate, overlapping, somewhat keeled, fleshy pointed at the apex; corolla tube cylindrical, becoming urceolate in fruit; lobes spreading, oval, obtuse to slightly acutish; scales ovate, about reaching the filaments, crenulate about the upper portion, bridged somewhat below the middle; stamens shorter than the lobes; filaments slightly subulate, as long as or longer than the oval, sagittate, versatile anthers; ovary globose; styles slightly subulate, equal, (including the stigmas) longer than the ovary; stigmas curving and reddish, about as long as the styles. Capsule globose, circumscissile, the withered corolla carried at the apex; seeds about 1 mm. long, light brown, finely punctated and more or less scurfy, usually four in a capsule, oval, or somewhat oblong, angled, rather robust; hilum short, oblong, transverse or oblique, sometimes scarcely visible.

Type locality:- Probably near Naples, Italy. Range in North America:- Throughout most of the western states from Washington and Wyoming south to Colorado and New Mexico.

Specimens examined:- Wyoming: Between Sheridan and Buffalo (Tweedy 3492, the type of C. gracilis, in the N.Y.Bot.Gard.herb.); Little Goose Fields (Willets 558); Laramie (Nelson 1139; 1310); Teton Forest Reserve (Brandegee in 1897); Wheatland (Fay in 1914); Seminole Mts.(Nelson 4936, the type of C. Anthemi, in the Rky.Mt. herb. Univ.Wyo.): Utah: Salt Lake City (Garrett 1002; Smith 1831);

Ogden (Tracy & Evans in 1887); Provo (Tracy in 1887); Little Springs (Rydberg & Garrett 8541); without location (Hillman in 1899): Nevada: Reno (Heizer 345; Hillman); Ormsby Co.(Baker 1477); Nevada City (Hurst in 1890): Colorado: Fort Collins (without indication of collector 4222): Washington: Cascade Mts.(Kammerer 98): Oregon: Powder River Valley (Cusick 2341): New Mexico: San Juan Co.(Standley 8058): California: Siskiyou Co.(Brown 492).

4. Cuscuta europaea Linnaeus.

C. europaea Linnaeus, Spec. Pl. 124. 1753.---Engelmann, Trans. Acad. Sci. St. Louis 1:468. 1859.

No American synonymy. For the foreign synonymy see Engelmann, l.c. 468.

Stems medium to slender. Flowers about 2-3 mm. long on short, thick pedicels in globular, compact clusters, glabrous, mostly tetramerous, infrequently tri- or pentamerous; calyx lobes ovate, obtuse, shorter than the corolla tube; corolla tube campanulate, becoming urceolate as the fruit develops; lobes upright to spreading, triangular, obtuse, overlapping; scales small, thin and difficult to make out, shorter than the tube, bifid and with few processes which are most prominent towards the apex, bridged at about a third of their height; stamens shorter than the lobes; filaments somewhat subulate, about equal to the oval or roundish, slightly versatile anthers; styles shorter than the globose, slightly pointed ovary; stigmas filiform, as long as or shorter than the styles, styles and stigmas together shorter than the ovary. Capsule globose-conic, capped by the withered corolla, circumscissile; seeds about 1.5 mm. long, usually four in a capsule, oval, compressed, slightly angled; hilum oblong, transverse.

Type location:- Europe. Casual in America.

Specimens examined:- Maine: Gilead (Furbish in 1897): California: near Clear Lake (Bolander 2673): West Indies; Hayti (Poiteau).

5. Cuscuta Epilinum Weihe.

C. Epilinum Weihe, Archiv. d. Apoth. 8:54. 1824.---Engelmann, Trans. Acad. Sci. St. Louis 1:470.1859.---Matthew, Bull. Torr. Bot. Club 20. pl. 164. f.1. 1893.---Britton & Brown, Illustr. Flora 3:28. f.2957. 1898; 2 ed. 3:48. f.3442. 1913.

No American synonymy. For foreign synonymy see Engelmann l.c. 470.

Stems slender to medium. Flowers about 3 mm. long, glabrous, sessile, in scattered compact glomerules; calyx as long as the corolla and somewhat loose about it; lobes broadly ovate, acute; corolla urceolate, early conforming to the shape of the capsule; lobes ovate-triangular, obtuse, shorter than the tube; scales shorter than the tube, spatulate-truncated, crenulate about the upper portion, thin, bridged somewhat below the middle; stamens shorter than the lobes; anthers ovate, subcordate, about as long as the somewhat subulate filaments; ovary depressed-globose; styles short, about equal to the linear, slightly tapering stigmas; the style and stigma together much shorter than the ovary. Capsule depressed globose, somewhat angled about the developing seeds, circumscissile, leaving the obcordate dissepiment in the calyx, carrying the withered corolla at the apex; seeds frequently occurring in pairs, about 1.2 mm. long, round or ovate to oval, angular, somewhat scurfy; hilum linear, oblong, transverse or oblique.

Type locality:- Europe. Range in North America:- Eastern and central United States and in Canada, always? on Linum.

Specimens examined:- A fragment of the type in the Engelmann herb: Delaware: Wilmington (Canby); Centreville (Tatnall in 1863; Commons in 1863); New Castle Co.(Commons 5850): New York: Buffalo (Clinton); Albany (Beck); Kelloggsville (Kilborne in 1882); Greenwich (Schrenk in 1890): Ohio: New London (Dewey in 1902): Michigan: East Lansing (Wheeler in 1899): Pennsylvania: Lancaster Co. (Porter in 1863): Lower Canada: (Pringle in 1890).

Sub-genus Grammica (Lour.) Engelmann.

Cuscuta group Grammica (Lour.) Engelmann, Trans. Acad. Sci. St. Louis 1:459. 1859.

Grammica Loureiro, Fl. Cochinch. 1:170. 1790.

Kadula Rafinesque, Fl. Tellur. 4:90. 1836.

Anthanema Rafinesque, ibid. 90. 1836.

Pentake Rafinesque, ibid. 90. 1836.

Nemepis Rafinesque, ibid. 91. 1836.

?Dastylepis Rafinesque, ibid. 125. 1836.

?Eronema Rafinesque, ibid. 125. 1836.

Lepidanche Engelmann, Amer. Journ. Sci. & Arts 43:343. t.6. 1842.

Engelmannia Pfeiffer, Bot. Ztg. 3:673. 1845. not Torrey & Gray 1841 nor Klotzsch 1841.

Pfeifferia Buchinger, Ann. sci. nat. III. 5:88. 1846. not Salm-Dyck 1845.

Cuscutina Pfeiffer, Bot. Ztg. 4:492. 1846.

Buchingera F. Schultz, Jahrb. f. Pharmacie 1847 (cf. Bot.Ztg. 6:760. 1842).

Cassutha Des Moulins, Études org. cusc. 77. 1853.

Flowers sessile or pedicellate; styles usually unequal, distinct; stigmas capitate; capsule circumscissile or remaining closed. All the species found native in North America belong here.

A small number parasitise economically important plants.

Key to the sections.

Capsule circumscissile - Eugrammica.
Capsule remaining closed - - - - - - - - - - - - - - - - - - Clistogrammica.

Section Eugrammica Engelmann.

Cuscuta section Eugrammica Engelmann, Trans. Acad. Sci. St. Louis 1.476. 1859.

Capsule more or less regularly circumscissile. Flowers with or without numerous subtending bracts; a few species with distinct prongs on the dorsal surface of the corolla lobes; styles slender or tapering from broad bases. Typically of the southwestern and southern United States and of Mexico: a small number getting over into the West Indies.

Key to the subsections.

Styles subulate, divisions of the flowers obtuse.
    Flowers not subtended by numerous bracts - - - - - - Subulatae.
    Flowers subtended by numerous bracts - - - - - -Lepidanchopsis.
Styles of about the same thickness throughout.
    Divisions of the perianth mostly obtuse- - - - - Obtusilobae.
    Divisions of the perianth acute to acuminate- - - Leptilobae.

Subsection Subulatae Engelmann.

Cuscuta § Subulatae Engelmann, Trans. Acad. Sci. St. Louis 1:476.1859.

Flowers large; the perianth divisions mostly obtuse; styles subulate, stout, upright or mostly more or less divergent. Typically Mexican and West Indian species.

Key to the species.

Calyx lobes orbicular or ovate, overlapping, without dorsal prongs.
    Calyx lobes orbicular, denticulate; styles longer than the
        ovary and capsule, intrastylar aperture rather small -

\- 6. C. erosa.

Calyx lobes ovate, entire, styles shorter than the ovary and capsule.

Calyx lobes ovate, usually as long as broad, styles widely divergent; stigmas not particularly convoluted.

Corolla lobes about equalling the corolla tube; styles broadly conical - - - -7. C. mitraeformis.

Corolla lobes usually shorter than the corolla tube; styles not so broadly conical -

-8. C. jalapensis.

Calyx lobes broader than long, styles not so widely divergent; stigmas rather larger and convoluted -

-9. C. rugosiceps.

Calyx lobes more elongated, each with a dorsal prong.

Corolla lobes oblong, obtuse; scales large, about reaching the filaments, bridged at about the middle -

-10. C. ceratophora.

Corolla lobes ovate, acutish; scales much reduced, shorter than the tube, scarcely bridged - - - 11. C. chapalana.

6. Cuscuta erosa n. sp.

Stems medium. Flowers glabrous, about 3 mm. long, pentamerous, on pedicels as long as or longer than the flowers, closely clustered about the host in cymose panicles, somewhat reddish brown; calyx lobes orbicular, obtuse, denticulate, overlapping, cupped, membranous at the edges, fleshier in the median portion, nearly distinct, shorter than or equalling the corolla tube; corolla campanulate; lobes upright or spreading, about as long as or slightly shorter than the tube, oblong, obtuse, some flowers possessing more or less

of a horn-like projection at the end of a thickened vein-like elevation on the dorsal surface of each lobe near the apex; scales broad, fringed, shorter than the tube, bridged at about their middle; stamens shorter than the lobes; anthers oval, about equal to the subulate filaments; styles subulate, longer than the globose ovary. Capsule globose, circumscissile, usually one seeded; styles stouter and more divergent, the withered corolla about the capsule or capping it; seeds about 1.5 mm. long, globose, ovate, compressed, with a short, linear, transverse line or a dot for a hilum.

Type locality:- Sonora, Mexico. Range:- Arizona and northern Mexico.

Specimens examined:- Mexico: Sonora (Palmer in 1869, the type, in the U.S.Nat.Herb. as sheet 49,836); Arizona: Santa Rita Mts., south of Tucson (Engelmann in 1880).

7. Cuscuta mitraeformis Engelmann.

C. mitraeformis Engelmann in Hemsl., Diag. Pl. Nov. 4:54. 1878-1880.

Stems coarse. Flowers glabrous, 4-6 mm. long, pentamerous, on short pedicels in compact globular clusters; calyx lobes about as long as the corolla tube, ovate, obtuse, unequal, ovarlapping, the larger lobes usually strongly and unevenly carinate, the others less so; corolla campanulate; lobes ovate, obtuse, about as long as the tube, spreading to reflexed; scales oblong, sometimes somewhat truncate, as long as the tube, deeply fringed; stamens shorter than the lobes; filaments subulate, equal to the oblong anthers; ovary conical; styles shorter than the ovary, subulate, continuing the outlines of the ovary; stigmas capitate, sometimes slightly convoluted. Capsule 5-8 mm. long, circumscissile, with the withered corolla about it; styles widely divergent like horns; seeds oval, about 2 mm. long, angled; hilum short, oblong, transverse.

Type locality:-"Enroute San Luis Potosi to Tampico, Mexico". Range:- Central and southern Mexico.

Specimens examined:- Mexico: Between San Luis Potosi and Tampico (Palmer Dec. 1878 to Feb. 1879, the type, in the Engelmann herb.); Vera Cruz, Jalapa (Rose & Hay 6170), Orizaba (Smith 204); State of San Luis Potosi (Palmer 137); State of Michoacan (Pringle 4330).

8. Cuscuta jalapensis Schlechtendal.

C. jalapensis Schlechtendal, Linnaea 8:515. 1833.---Engelmann, Trans. Acad. Sci. St. Louis 1:478. 1859.

Stems medium. Flowers 3-3.5 mm. long, glabrous, pentamerous, in dense clusters, on pedicels as long as or shorter than the flowers; calyx shorter than the campanulate corolla, lobes overlapping, ovate, obtuse, somewhat thickened and verrucose along the middle; corolla lobes ovate, obtuse, shorter than the tube, upright to reflexed; scales about as long as the tube, fringed; stamens shorter than the lobes; anthers ovate, about equalling the slightly subulate filaments; ovary globose-conic, styles shorter than the ovary, strongly subulate. Capsule circumscissile, globose, surrounded by the withered corolla, the conical styles widely divergent; seeds about 1.5 mm. long, ovate; hilum narrow, transverse.

This species is closely allied with C. mitraeformis but seems to differ from it in the smaller flowers, more globose ovary and less conical styles.

Type locality:- "Prope Jalapam, Mexico." Range:- Mexico.

Specimens examined:- Mexico: Jalapa (Schiede 152, the type number, in the Engelmann herb.); Mexico City (Bustamente 83); near Mexico (Graham 250); San Luis Potosi, San Luis Potosi (Palmer 631); State of Chihuahua, Chihuahua (Townsend & Barber 294; Pringle 291),

Sierra Madre (Pringle 1342).

9. Cuscuta rugosiceps n. sp.

Stems coarse. Flowers glabrous, 5-6 mm. long, sessile, in compact clusters; calyx large, campanulate, nearly as long as the corolla tube; lobes short, broad, unequal, obtuse, somewhat lobed at the sinuses, overlapping, frequently carinate; corolla campanulate; lobes ovate, obtuse, spreading, shorter than the tube; scales reaching the filaments, fringed, bridged at about the middle; stamens shorter than the lobes; anthers oval, about equal to the somewhat subulate filaments; ovary small, somewhat conic, tapering into the subulate styles; stigmas large and more or less convoluted. Capsule circumscissile, with a very thick apex giving the capsule a conic appearance, surrounded by the withered corolla; seeds usually four in a capsule, round, compressed, about 1.4 mm. long; hilum at one end, short, elliptical or a dot; umbilical area somewhat finely striated.

This species resembles C. jalapensis somewhat in the shape of its capsule, but is different in the shape of its calyx and the short, broad lobes; from C. floribunda and C. macrocephala it differs in the short, subulate styles and the thickened apex of the capsule.

Type locality:- Mexico, State of Oaxaca. Range:- Western and southern Mexico.

Specimens examined:- Mexico: State of Oaxaca, Sierra de San Felipe (Pringle 4967, the type, in the U.S.Nat.Herb. as sheet 252,219); State of Jalisco, Volcano of Colima (M.E. 347).

10. Cuscuta ceratophora n. sp.

Stems slender. Flowers glabrous, about 3 mm. long, pentamerous, sessile, in compact clusters; calyx lobes slightly longer

than the corolla tube or about equalling it, oblong, obtuse, with uneven edges and a mucronate tip, or the apex more obtuse with a horn-like projection from its dorsal surface near the tip; corolla lobes about as long as the campanulate tube, upright to spreading, oblong, obtuse, irregularly toothed at the apex and with a subapical horn-like projection; stamens shorter than the corolla lobes; anthers small, cordate, slightly versatile and shorter than the somewhat subulate and rather stout filaments; scales reaching the filaments, broad, ovate, fringed with short processes, bridged at about their middle; styles stout, much longer than the small, globose ovary; stigmas capitate. Capsule globose, circumscissile with a small opening; styles subulate and somewhat divergent; seeds not seen.

The collections of this species are all rather fragmentary, but it appears to be well characterized. In a number of flowers well developed buds were found between the calyx and corolla. This has not been observed, so far as recorded, in any other species.

Type locality:- "États de Michoacan et de Guerrero", Mexico. Range:- Southern Mexico and the lesser Antilles.

Specimens examined:- Mexico: States of Michoacan and Guerrero (Langlassé 438, the type, in the U.S.Nat.Herb. as sheet 385,946); Vera Cruz (Müller in 1853); West Indies: Curaçao, Patrick (Britton & Shafer 3069).

11. Cuscuta chapalana n. sp.

Stems medium. Flowers 3-4 mm. long, glabrous, pentamerous, subsessile, the pedicels much shorter than the flowers, in compact cymose clusters; calyx deeply divided, shorter than or equalling the corolla tube; lobes ovate, acutish, thickened along the mid portion of the dorsal surface which bears a short projection near the apex; corolla cylindrical, slightly baggy in the basal region; lobes

shorter than the tube, somewhat overlapping, erect to spreading, ovate, acutish, with a prong-like dorsal projection near the apex; scales very small, reaching not more than the middle of the tube, oblong, with a few short processes at the truncated apex, scarcely bridged; stamens shorter than the lobes; filaments shorter than the somewhat oval, subsessile anthers; styles subulate, as long as or shorter than the small, globose-conic ovary; stigmas capitate. Not seen in fruit, but this quite evidently circumscissile.

This species resembles C. corymbosa somewhat but differs in its more deeply divided calyx and subulate styles.

Type locality:- Mexico: Jalisco, near Lake Chapala. Range:- Known only from the type location.

Specimens examined:- Mexico: Jalisco, mountains near Lake Chapala (Pringle 5349, the type, in the U.S.Nat.Herb. as sheet 305, 846.)

Subsection Lepidanchopsis n. subsect.

Flowers sessile in compact more or less continuous clusters, subtended by numerous bracts; calyx lobes nearly distinct, obtuse.

Only one species has been found so far in this section. Some specimens are quite similar in habit to C. glomerata.

12. Cuscuta Pringlei n. sp.

Stems medium. Flowers glabrous, subsessile to sessile, about 4 mm. long, pentamerous, compacted into dense elongated clusters about the host plant much as in C. glomerata or more loosely paniculate; flower parts somewhat fleshy; calyx segments slightly united, ovate, cupped, appressed to the corolla, overlapping, subtended by several unequal bracts of much the same shape as the calyx lobes, edges of the bracts and calyx lobes slightly irregular

and the thickened median portion reddish; corolla campanulate, lobes oblong-ovate, spreading, about as long as the tube and with the edges slightly uneven; scales ovate, reaching the filaments, copiously fringed with medium length processes, bridged at or slightly above the middle; stamens shorter than the lobes; anthers oblong, about as long as the filaments; ovary globose-conic, becoming umbonate; styles longer than the ovary, exserted in fruit. Capsule umbonate, thickened at the apex, circumscissile with a slightly jagged edge leaving the obcordate dissepiment in the persistent calyx; seeds usually three or four in a capsule, about 1.5 mm. long, angled, oval or roundish, light brown or chocolate brown, mottled?; hilum short, oblong, oblique to transverse or reduced to a roundish dot.

This is the only species seen possessing the combination of circumscissile capsule and numerous subtending bracts.

Type locality:- Mexico: Jalisco, hillside near Guadalajara.

Specimens examined:- Mexico: Jalisco, hillside near Guadalajara (Pringle 2472, the type. in the U.S.Nat.Herb. as sheet 49,852).

Subsection Obtusilobae Engelmann.

Cuscuta § Obtusilobae Engelmann, Trans. Acad. Sci. St. Louis. 1:479. 1859.

Flowers mostly relatively large; calyx rather deep; lobes obtuse, more or less overlapping; styles slender. Typically of Mexico, the West Indies and the southern United States.

Key to the species.

Flower short, the corolla lobes about equalling the tube.

Calyx lobes deltoid, slightly, if at all, overlapping - - 13. C. applanata

Calyx lobes orbicular or ovate, overlapping - 14. C. tinctoria

Flowers relatively long; corolla lobes shorter than the tube.

Calyx deeply divided; lobes orbicular - - - 15. C. floribunda.

Calyx cup deep; lobes short, broadly ovate.

Flowers about 3 mm. long; scales about reaching the filaments, bridged at the middle or above - - 16. C. americana.

Flowers about 5-6 mm. long; scales shorter than the tube, bridged below the middle.

Corolla bulging outward between the furrowed stamen attachments; scales sparingly fringed; calyx lobes not greatly overlapping - 17. C. corymbosa grandiflora.

Corolla cylindrical, not particularly furrowed; calyx about reaching the middle of the corolla tube or shorter, lobes not greatly overlapping 17. C. corymbosa stylosa.

Corolla cylindrical, not furrowed, scales prominent; calyx lobes broad, overlapping and somewhat angled at the sinuses; stigmas relatively large - 18. C. macrocephala.

13. Cuscuta applanata Engelmann.

C. applanata Engelmann, Trans. Acad. Sci. St. Louis 1:479. 1859.

C. alata Brandegee, Univ. Calif. Publ. Bot. 3:338. 1909.

Stems medium to coarse. Flowers glabrous, pentamerous, 2-3 mm. long, somewhat fleshy or membranous, subsessile on pedicels shorter than the flowers, in dense cymose panicles; calyx slightly shorter than or equalling the corolla tube; lobes broad, triangular-ovate, obtuse, frequently irregularly keeled in the median portion and below the sinuses down onto the short pedicels; corolla campanulate, conforming in shape to the maturing capsule; lobes ovate to oblong, obtuse to acutish, with slightly uneven edges, spreading, nearly as long as or equalling the tube; scales longer than the tube, spatulate, fringed towards the apex with medium length processes, bridged

at from one-quarter to one-third their height; stamens shorter than the lobes; anthers ovate, slightly cordate, about equal to the filaments; styles exserted, unequal, as long as or longer than the globose ovary; stigmas capitate. Capsule depressed-globose, somewhat four-sided about the developing seeds, circumscissile, leaving the obcordate dissepiment in the calyx, surrounded by the withered corolla; seeds brown, about 1.4 mm. long, oval, usually four in each capsule; hilum short, oblong, transverse to oblique.

This species somewhat resembles C. pentagona but is easily distinguished from it by the circumscission of it's capsule. The type of Brandegee's C. alata is a small, strongly keeled form. Some of the smaller forms of C. applanata approach the larger forms of C. potosina but are differentiated from them by the possession of longer styles and more oblong, obtuse corolla lobes.

Type locality:- "In Arizona Territory south of the Gila River." Range:- Mexico, Texas, Arizona and New Mexico.

Specimens examined:- Mexico: San Luis Potosi (Palmer 631½); San Luis Potosi to San Antonio, Texas (Parry 500): Puebla, Puebla (Purpus 5730), Tehuacan (Rose & Rose 11413; Rose, Painter & Rose 10275, 9887 & 9888; Rose & Hay 5866), San Luis Tultitlanapa (Purpus 3554): Durango (Palmer 641), Mapimi (Palmer 517): Chihuahua (Pringle 784; Palmer 142 and 227): Zacatecas, San Juan Capistrano (Rose 2445): Sinaloa, Culiacan (Brandegee in 1904, the type of C. alata, in the Univ. Calif. herb.): Arizona: (Wright 1623=541, Mexican Boundry Survey, taken as the type, in the Engelmann herb.); San Francisco Mts. Forest Reserve (Leiberg 5965): New Mexico: (Wright 1625); Rita de las Frijoles (Cockerell 20): Texas: Presidio (Trelease 342); El Paso (Stearns 205).

[illegible] be [illegible]

[illegible] or [illegible]

[illegible] I I [illegible]

14. Cuscuta tinctoria Martius.

C. tinctoria Martius in Engelmann, Trans. Acad. Sci. St. Louis 1:480. 1859.--Progel in Martius, Flora Brasiliensis 7. pl. 126. f.6. 1871.

Stems medium to slender or in some specimens rather coarse. Flowers glabrous, 4-5 mm. long, pentamerous, sessile or subsessile, usually subtended by one orbicular, cupped bract, single or in dense glomerules of many flwers; calyx lobes unequal, orbicular or ovate, obtuse, overlapping, as long as the corolla, sometimes with an irregular keel; corolla campanulate, becoming urceolate in fruit, thinner towards the base; lobes ovate, oblong, obtuse, overlapping, upright or mostly spreading; scales reaching the filaments, copiously fringed, bridged at about the middle; stamens shorter than the lobes; filaments about equal to the oval-oblong, somewhat versatile anthers; styles longer than the globose ovary, becoming exserted in fruit. Capsule depressed-globose or somewhat ovate and pointed, circumscissile; seeds about 1.5 mm. long, three or four usually in each capsule, angled, olive brown; hilum oblong, linear, transverse, areola dark chocolate in some but lighter in others.

Type locality:- Mexico, Oaxaca. Range:- Throughout Mexico and to Guatemala.

Specimens examined:- Mexico: Oaxaca, Oaxaca (Karwinski in 1827, taken as the type, a specimen in the Engelmann herb.); Between Victoria and Rio Blanco (Karwinski in 1842); State of Jalisco (Pringle 4529; Palmer 579; Rose & Painter 7473); Puebla, Tehuacan (Purpus 5708), Puebla (Purpus 3553): States of Coahuila & Nuevo Leon (Palmer 918): San Luis Potosi, San Luis Potosi (Parry & Palmer 631; Palmer 87; Schaffner 377; 781, labelled C. zacatlasculi n.sp; Gregg 570); Queretaro, Queretaro (Rose & Rose 11150): Guatemala:

(Heyde 287); Quiché (Heyde & Lux 2912).

15. Cuscuta floribunda Humboldt, Bonpland & Kunth.

C. floribunda Humboldt, Bonpland & Kunth, Nov. Gen. et Sp. 3:96. 1818.---Choisy, Mém. Soc. Phys. et Hist. Nat. Genève 9:283. 1841; and in DC., Prodromus 9:459. 1845.--Engelmann, Trans. Acad. Sci. St. Louis 1:481. 1859.

Flowers about 4 mm. long; calyx lobes orbicular, obtuse, overlapping, shorter than the corolla tube; corolla cylindrical; lobes ovate-oblong, obtuse, between one-half and three-quarters as long as the tube, reflexed; scales somewhat triangular, reaching the filaments, rather sparingly fringed with medium length processes; filaments subulate; anthers ovate. Capsule globose with a thickened apex and ridge or collar about the intrastylar aperture; styles longer than the capsule. Seeds not seen.

The fragment of the type from which this description is drawn is in the Engelmann herbarium. It apparently possesses characters that distinguish it from all others.

Type locality:- "in calidis Novae Hispaniae, prope pontem Istlae."

Specimens examined:- At the Bridge of Istla, western Mexico (Bonpland, the type, a fragment in the Engelmann herb.)

16. Cuscuta americana Linnaeus.

C. americana Linnaeus, Spec. Pl. 124. 1753.--Choisy, Mém. Soc. Phys. et Hist. Nat. Genève 9:282. pl. 4. f.4. 1841; and in DC., Prodromus 9:459. 1845.--Engelmann, Trans. Acad. Sci. St. Louis 1:482. 1859.--Progel in Martius, Flora Brasiliensis 7. pl.126. f.1. 1871.

Stems medium to coarse. Flowers glabrous 2.5-4 mm. long, pentamerous, subsessile in cymose racemose, compact or somewhat

loose clusters; calyx tubular, as long as or somewhat shorter than the corolla tube; lobes ovate-orbicular, overlapping, obtuse, short; corolla cylindrical, included in the calyx with usually only the short, ovate, obtuse, upright to slightly spreading lobes exserted, but becoming exserted on the capsule; scales triangular, or sometimes somewhat oblong, fringed, shorter than the tube or sometimes reaching the base of the stamens, usually bridged about the middle or above; stamens subsessile, on filaments shorter than the anthers, included; anthers oval and in some specimens with the connective produced into a slight apiculation; styles longer than the globose ovary, becoming exserted, slender; stigmas capitate. Capsule globose-ovoid, circumscissile, capped by the withered corolla; seeds about 1.5 mm. long, light brown, usually but one or two in a capsule, ovoid, slightly compressed, with an indentation running lengthwise; hilum small, oval, oblique or reduced to a rounded spot.

It is rather questionable what species of Cuscuta Linnaeus referred to as C. americana. It has been thought best to retain the name for this species, as indicated by Engelmann. For a discussion of the confusion regarding the name see Coulter (42).

There appear to be two forms of this species based more or less on difference in size. One, var. congesta, is common in Mexico and the West Indies, while the other, var. spectabilis, is rather closely confined to the West Indies.

Cuscuta americana congesta Progel.

C. americana congesta Progel in Martius, Fl. Brasiliensis 7:333. 1871.

C. congesta Bentham, Bot. Sulph. 138. 1844.--Engelmann, Trans. Acad. Sci. St. Louis 1:422. 1859. in synon.

C leiolepis Miquel, Linnaea 18:247. 1844.--Engelmann, ibid. in synon.

C. surinamensis Schilling, de Lepra p. 60 & 200. t.2.--Engelmann,

ibid. in synon.

C. campanulata Nuttall in Engelmann, ibid. in synon.

Flowers about 2-3 mm. long, closely compacted in many flowered clusters, usually dark brown in herbarium specimens; stamens frequently with an apiculation of the connective; capsule ovoid, usually one-seeded; scales ordinarily bridged above the center.

Type locality:- Mexico: Guerrero, Acapulco. Range:- Throughout the West Indies and in Mexico.

Specimens examined:- Fragments of the types of C. campanulata and C. leiolepis in the Engelmann herb. Bahamas: Cat Island (Britton & Millspaugh 5963); Grand Turk Island (Millspaugh & Millspaugh 9029); Gervernor's Harbor (Hitchcock in 1890); Berry Islands (Britton & Millspaugh 2208): Cuba: (Linden 1994; Wright 1659); El Cobre (Britton, Cowell & Shafer 12887); Rio San Juan (Britton, Earle & Wilson 5917); Guantanamo Bay (Britton 1910); Santa Clara Prov. (Combs 546): Isle of Pines: (Britton, Wilson & Selby 14493; 15321): Santo Domingo: (Rose, Fitch & Russell 3691): Haiti: (Nash & Taylor 1578): Jamaica: (Britton 3897); Kingston (Britton 3006; Hitchcock in 1890): St. Thomas: (Britton, Britton & Shafer 43): Barbados: (Dash 628): Guadeloupe: (Père Duss 2468): Martinique: (Père Duss 1878; Sieber 91)· Grenada: (Broadway in 1905): Curaçao: (Britton & Shafer 3065): Mexico: Sonora, Guaymas (Brandegee in 1893; Palmer 331); (Hartman 236): Guerrero (Langlassé 127), Acapulco (Bentham 138, the type of C. congesta, a fragment in the Engelmann herb; Palmer 341); Sinaloa, Mazatlan (Gregg in 1849; Rose, Standley & Russell 13727; Brandegee in 1893): Yucatan (Linden).

Cuscuta americana spectabilis Progel.

C. americana spectabilis Progel in Martius, Fl. Brasiliensis 7:377. 1871.

C. spectabilis Choisy, Mém. Soc. Phys. et Hist. Nat. Genève 9:283. pl.5. f.1. 1841; and in DC., Prodromus 9:459. 1845.--Engelmann, Trans. Acad. Sci. St. Louis 1:483. 1859. in synon.

C. globulosa Bentham, Bot. Sulph. 138. 1844.--Engelmann, l.c. in synon.

Flowers 3-4 mm. long, less densely compacted in fewer flowered clusters; flowers ordinarily of a lighter color and rather more membranous; stamens ordinarily not apiculate; scales somewhat more deeply bridged and fringed; capsule slightly depressed and ordinarily two-seeded with the seeds larger.

Type locality:- "Hab. circa Bahiam." Range:- In the West Indies throughout the Greater Antilles and the Leeward Islands and sparingly in Mexico?.

Specimens examined:- Bahamas: Anguilla Islands (Wilson 7983): Cuba: (Linden 1994; Wright 1659 and in 1865; Pollard & Palmer 393). Santiago (Hamilton 16): Porto Rico: (Sintenis 3239; Britton, Britton & Marble 2227; Heller 1899; 6169; Goll 711; 565; Underwood & Griggs 636); La Vigna, Culebra (Britton & Wheeler 224; Britton, Cowell & Brown 5379): Virgin Gorda (Britton & Fishlock 1101): St. Thomas (Kuntze 555; 556; Britton, Britton & Shafer 137): Tortola (Britton & Shafer 707): Santo Domingo (Poiteau in 1802; in 1845; Wright, Parry & Brummell 391; Fuertes 194): Hayti, Azua (Rose, Fitch & Russell 3853); Santo Domingo City (Rose, Fitch & Russell 3763): St. Croix (Ricksecker 313; 313a; 93; Rose, Fitch & Russell 3604; 3608): Montserrat (Shafer 31): Antigua (Rose, Fitch & Russell 3279): Mexico: Acapulco (Bentham 138, the type of C. globulosa, a fragment in the Engelmann herb.); Yucatan (Gaumer 705, a more elongated form).

17. Cuscuta corymbosa Ruiz & Pavon.

C. corymbosa Ruiz & Pavon, Fl. Peruv. 1:69. pl. 105. f.b. 1798.--Choisy, Mém. Soc. Phys. et Hist. Nat. Genève 9:276. 1841; and in DC., Prodromus 9:456. 1845.--Engelmann, Trans. Acad. Sci. St. Louis 1:483. 1859.--Progel in Martius, Fl. Brasiliensis 7. pl.126. f.2. 1871.

Stems medium. Flowers glabrous, 4-7 mm. long, pentamerous, subsessile on pedicels much shorter than the flowers, forming a more or less corymbose-paniculate inflorescence; calyx membranous, loose about the corolla, angled, lobes short, broad, obtuse, slightly overlapping, scarcely reaching, or exceeding the middle of the corolla tube; corolla more or less globular and furrowed along the stamen attachments in the lower part, or cylindrical and scarcely furrowed; lobes about a fourth as long as the tube, ovate, obtuse, upright to spreading; scales narrow, with rather short, scattered processes, shorter than the tube, adnate for the larger part of their length, bridged below the middle; stamens about half as long as the lobes; filaments shorter than the oval anthers; styles longer than the small globose or ovoid ovary, becoming exserted. Capsule small, globose, circumscissile, somewhat glandular, capped and surrounded by the withered corolla; seeds about 1.5 mm. long, robust, compressed, one to four in a capsule, oblique; hilum short, oval, oblique or transverse.

Cuscuta corymbosa grandiflora Engelmann.

C. corymbosa grandiflora Engelmann, Trans. Acad. Sci. St. Louis 1:483. 1859.

C. popayanensis Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 3:123. 1818.--Choisy in DC., Prodromus 9:460. 1845.--Engelmann, l.c. 483. in synon.

C. cymosa Willdenow in Roemer & Schultes, Syst. 6:205. 1820.--Engelmann, l.c. 483. in synon.

C. inclusa Choisy, Mém. Soc. Phys. et Hist. Nat. Genève 9:275. pl. 2. f.2. 1841; and in DC., Prodromus 9:455. 1845.--Engelmann, l.c. 483.in synon.

C. patens Bentham, Bot. Voy. Sulph. 35. 1844.--Engelmann,' l.c. 483. in synon.

C. laxiflora Bentham, Bot. Voy. Sulph. 138. 1844.--Engelmann, l.c. 483. in synon.

Flowers large (5-7 mm. long); anthers nearly or quite sessile; corolla furrowed along the stamen attachment, particularly in the lower portion, bulging between the furrows; scales set out on more or less of a ridge away from the corolla in many specimens; capsule globose; calyx more than half as long as the tube.

Type locality:- New Granada?. Type not seen. Range:- Central Mexico south to Guatemala and Costa Rica.

Specimens examined:- Mexico: (Berlandier 1103, the type of C. inclusa, a specimen of the type number in the Engelmann herb; Hahn 18); Lower California, Magdalena Bay (Bentham 35, the type of C. patens, a fragment of the type in the Engelmann herb.); State of Jalisco (Pringle 4331); Federal District, Valley of Mexico (Pringle 11306 or 1130C); Tepic, Acaponeta (Rose, Standley & Russell 14329); State of Tamaulipas, Victoria (Palmer 56 or 52); Guerrero, Acapulco (Bentham 138, the type of C. laxiflora, a fragment of the type in the Engelmann herb.): Guatemala: Alta Vera Paz (von Türckheim II 1547); Mazatenango (Kellerman 4591; Bernoulli 59); San Felipe (Kellerman 5576); Acutima (Smith 1912); Solola (Kellerman 5916a): Costa Rica:(Tonduz 11750).

Cuscuta corymbosa stylosa Engelmann.

C. corymbosa stylosa Engelmann, Trans. Acad. Sci. St. Louis 1:484. 1859

C. stylosa Choisy, Mém. Soc. Phys. et Hist. Nat. Genève 9:283. pl. 5. f.2. 1841; and in DC., Prodromus 9:459. 1845.

Flowers shorter than in the preceeding variety (4-5 mm. long). Corolla cylindrical and slightly, or not at all ventricose; calyx not ordinarily reaching beyond the middle of the tube; filaments sometimes as long as the anthers; ovary globose-ovoid to conic. Choisy's figure of the flowers of this variety does not correspond with the specimen of the type number examined, showing the division of the calyx too deep, etc.

Type locality:- Mexico. Range:- Central and southern Mexico.

Specimens examined:- Mexico: (Berlandier 822, the type of C. stylosa, a specimen of the type number in the Engelmann herb.); Federal District, Valley of Mexico (Pringle 6574); Puebla (Nelson 2014); Vera Cruz, Vera Cruz (Parry & Palmer in 1877), Zacuapan (Purpus 5745; 7564; 7775); Hidalgo, Zimapan (Galeotti 1412); Mexico, Toluca (Andrieux 214); Chiapas, Comitan (Linden); Guadaloupe, Vallé de Mexico (Bourgeau in 1866); Vallé de Cordova (Bourgeau in 1866).

18. Cuscuta macrocephala Schaffner, n.sp.

C. macrocephala Wilh. Schaffner in herb.

Stems coarse. Flowers glabrous, 5-6 mm. long, pentamerous, on pedicels as long as or shorter than the flowers in scattered cymose clusters; calyx deep, texture thick and rather fleshy, nearly covering in most specimens the cylindrical corolla, somewhat angled below the sinuses; lobes short, broadly ovate, lobed, overlapping; corolla lobes short, broadly ovate, obtuse, overlapping, lobed, up-

right to slightly spreading; scales deltoid-oblong, shorter than the corolla tube, shallowly fringed, bridged at, or somewhat below, the middle; stamens sessile; anthers oval; styles much longer than the globose or slightly conic ovary; stigmas broad (about .8 mm.), globular or slightly conic. Capsule circumscissile, globose, the withered corolla carried at the apex; seeds about 2 mm. long, one to four in each capsule, oval, angled; hilum a narrow transverse line.

This species somewhat resembles C. corymbosa grandiflora, from which it differs in the corolla not bulging between the stamen attachments, in the somewhat cordate lobes and their greater overlapping, and in the more prominent scales and larger stigmas.

Type locality: Mexico: Sinaloa, Culiacan. Range:- Central and northern Mexico.

Specimens examined:- Mexico: Sinaloa, Culiacan (Schaffner, without date or number, the type, in the N.Y. Bot. Gard. herb; Brandegee in 1904); Tamaulipas (Palmer 52); Lower California, San José del Cabo (Brandegee in 1897), San Bartolomé (Brandegee 409), Todos Santos (Brandegee in 1890), LaPaz (Palmer 141).

Subsection Leptolobae Engelmann.

Cuscuta § Leptolobae Engelmann, Trans. Acad. Sci. St. Louis 1:485. 1859.

Flowers mostly smaller; calyx lobes acute to acuminate; corolla lobes mostly as long as or longer than the tube,-in the last three species somewhat shorter; styles slender, longer than the ovary. Chiefly of Mexico, the West Indies and the southern and western United States.

Key to the species.

Calyx about equalling or exceeding the corolla.

Flowers ordinarily at least 2.5-3 mm. long; calyx lobes overlapping.

Anthers subsessile or sessile, flowers tetra- or pentamerous - 19. C. Purpusii.

Anthers on filaments about as long as the anthers.

Scales reaching the filaments, fringed, bridged at about the middle.

Corolla cylindrical, lobes lanceolate, acuminate, without a dorsal projection - - - - - - 20. C. Choisiana.

Corolla campanulate, lobes ovate, obtusish, ordinarily with a dorsal projection -21.C. odontolepis fimbriata.

Scales shorter than the tube, oblong, toothed about the apex, bridged below the middle - - - - 21. C. odontolepis.

Flowers mostly smaller; calyx lobes overlapping in one species, not overlapping in the others.

Styles not exceeding the ovary or capsule in length; scales rather sparingly fringed - - - - - - - 22. C. potosina.

Styles longer than the ovary and capsule; scales ordinarily rather abundantly fringed, but reduced to wings in one variety.

Flowers reddish; corolla deeply furrowed along the stamen attachments - - - - - - - - - 23. C. partita.

Flowers whitish; corolla not deeply furrowed.

Calyx segments not overlapping, as long as the corolla tube.

Calyx segments lanceolate, acuminate, scales shorter than the tube, fringed or reduced to wings - - 24. C. desmouliniana.

Calyx segments mostly triangular-acute to lanceolate; scales as long as or exceeding the tube (shorter in one variety of C. umbellata and reduced or absent in one variety of C. gracillima.)

Corolla lobes entire.

Flowers 2-7 mm. long; stamens shorter than the lobes; scales bridged below the middle; flower clusters rather loose and diffuse; stems profuse - - - - - - - - - - 25. C. umbellata.

Flowers about 2 mm. long; stamens longer or shorter than the lobes; scales bridged at about the middle or reduced in one variety; flower clusters globular; stems ordinarily disappearing from between the flower clusters- - 26. C. gracillima.

Corolla lobes deeply serrated or lacerated - - - 27. C. lacerata.

Calyx segments overlapping, shorter than the corolla tube - - 28. C. deltoidea.

Calyx much shorter than the elongated corolla.

Calyx lobes keeled or tuberculate in the middle, pentamerous - - 29. C. tuberculata.

Calyx lobes not keeled, penta- or tetramerous.

Flowers 3-4 mm. long, calyx papillate; corolla papillate in basal portion, scales bridged at about the middle - - 30. C. leptantha.

Flowers 4-5 mm. long; calyx and corolla glabrous; scales bridged at about a third of their **height** - - - - - - - - 31. C. polyanthemos.

19. Cuscuta Purpusii n. sp.

Stems slender to medium. Flowers glabrous, pentamerous (infrequently tetra- or trimerous), about 4 mm. long, on pedicels as

long as or longer than the flowers in loose few flowered cymose panicles; calyx nearly as long as or longer than the corolla; lobes ovate-triangular, acute, somewhat lanceolate, slightly lobed at the base, overlapping, tips somewhat divergent; corolla tube cylindrical, lobes spreading to reflexed, ovate, acutish, shorter than the tube, somewhat overlapping; scales nearly reaching the filaments, spatulate fringed, bridged at from a quarter to a third of their height; anthers elliptical or oblong, sessile or subsessile; styles longer than the globose ovary. Capsule probably circumscissile, though not seen in fruit.

Type locality:- Mexico: San Luis Potosi.

Specimens examined:- Mexico: San Luis Potosi (Purpus 4972; 5444, the type, in the Univ. California Herb. as sheet 157,411).

20. Cuscuta Choisiana n.sp.

Stems slender, 2.5-4 mm. long, waxy white and covered with white or transparent pellucid glandular appearing cells, nearly sessile, on pedicels as long as or mostly shorter than the flowers, clustered in compact clusters, each usually subtended by an ovate lanceolate bract; calyx lobes ovate-lanceolate, acute to acuminate, overlapping, equalling the corolla tube, spreading somewhat at the tips; corolla cylindrical-campanulate; lobes upright to spreading, lanceolate, acuminate, about equalling the tube; scales reaching the filaments, fringed with medium length processes, bridged at about their middle; stamens slightly shorter than the lobes; anthers ovate, sagittate, versatile, some anthers showing apiculate connective; ovary globose-ovoid, slightly conical through thickening about the intrastylar aperture; styles slender, longer than the ovary, exserted; stigmas capitate. Capsule globose, circumscissile; seeds 2-4 in a capsule, ovate-globose, compressed, slightly oblique; hilum short,

elliptical, oblique.

The name given this species is in honor of J.D. Choisy, the first botanist to monograph the dodders.

Type locality:- Mexico: San Luis Potosi. Range:- Central Mexico.

Specimens examined:- Mexico: San Luis Potosi, San Luis Potosi (Purpus 4971, the type, in the U.S. Nat. Herb. as sheet 842,189); Chapala (Purpus 5036).

21. Cuscuta odontolepis Engelmann.

C. odontolepis Engelmann, Trans. Acad. Sci. St. Louis 1:486. 1859.

Stems slender. Flowers white, 3-5 mm. long, pentamerous, on pedicels shorter than the flowers in dense cymose paniculate clusters usually with a broadly ovate, acute bract subtending one or several flowers; calyx shorter than or equalling the corolla tube, papillose-verrucose; lobes broad, ovate, deltoid, acute, overlapping; corolla cylindrical or campanulate, lobes shorter than or about equalling the tube, ovate, acute, upright to spreading or becoming reflexed, with or without a horn-like projection on the dorsal surface near the tip; scales large, oblong or somewhat spatulate, dentate about the upper portion only or fringed, shorter than the tube or reaching the filaments; stamens shorter than the lobes, anthers oblong or oval, about equal to the filaments; styles slender, much longer than the globose ovary, becoming exserted in fruit; stigmas capitate. Capsule globose, thickened at the apex, readily circumscissile; seeds about 1.2 mm. long, light brown, generally four in each capsule, angled; hilum linear, oblique.

Cuscuta odontolepis typica.

Scales oblong, bridged at about a quarter of their height, shorter than the tube, denticulate at the truncated apex only, cor-

olla cylindrical, lobes acute.

Type locality:-- Arizona. Range:- Northern and central Mexico and Arizona.

Specimens examined:- Arizona: (Wright 1624=529, the type, in the Engelmann herb.); Santa Rita Forest Reserve (Griffiths & Thornber 21); Santa Rita Mts. south of Tucson (Engelmann in 1880): Mexico: Sonora, Fronteras (Hartman 52).

Cuscuta odontolepis fimbriata n.var.

Flowers shorter and campanulate; corolla lobes more obtuse, sometimes mucronate or with a dorsal projection; scales somewhat spatulate, bridged at about the middle, fringed with medium length processes.

Type location:- Mexico: Durango, Papasquiaro. Range:- Central Mexico to Costa Rica.

Specimens examined:- Mexico: Durango, Papasquiaro (Palmer 412, the type, in the U.S. Nat. Herb. as sheet 304,596); Guanajuato, Guanajuato (Dugès in 1880): Costa Rica (Warscewicz in 1848).

22. Cuscuta potosina Schaffner.

C. potosina Schaffner in Watson, Proc. Amer. Acad. Arts & Sci. 18:124. 1883.

Stems slender. Flowers glabrous, about 2 mm. long, subsessile on pedicels shorter than the flowers in cymose panicles, commonly tetramerous or pentamerous, infrequently trimerous; calyx equal to or shorter than the corolla tube; lobes triangular acute; corolla campanulate or short cylindrical; lobes triangular acute, upright to slightly spreading, shorter than the tube; scales narrow, oblong, denticulate or fringed about the apex, shorter than the tube or reaching the filaments, bridged at about one-third their height;

stamens shorter than the lobes, filaments slightly longer or shorter than the oval to roundish anthers; styles filiform, as long as or shorter than the globose somewhat ovate or depressed ovary; stigmas small capitate. Capsule circumscissile with a small irregular opening, depressed-globose or ovoid, with the withered corolla at the apex or about it; seeds about 1 mm. long, one to four in a capsule, but commonly only one, globose, flattened on one side, rounded on the other, finely punctated; hilum linearl, oblique in a definite umbilical area of slightly darker color.

Cuscuta potosina typica.

Flowers commonly tetramerous. Corolla lobes connivent in fruit and corolla carried at the apex of the somewhat ovoid capsule; filaments about as long as or shorter than the anthers; scales scarcely reaching the filaments.

Type locality:- Near San Luis Potosi, Mexico. Range:- Central and southwestern Mexico.

Specimens examined:- Mexico: San Luis Potosi, San Luis Potosi (Schaffner 779, the type, in the Gray Herb; 379); State of Queretaro (Rose, Painter & Rose 9650).

Cuscuta potosina globifera n. var.

C. globifera Schaffner in herb.

Flowers larger, commonly pentamerous; filaments and scales longer. Capsule depressed-globose, surrounded by the withered corolla.

Type locality:- Near San Luis Potosi, Mexico. Range:- New Mexico and Arizona to central and southern Mexico.

Specimens examined:- New Mexico & Arizona Territory (Rusby 295): Mexico: (Pringle 7179); San Luis Potosi, San Luis Potosi (Schaffner 780, the type, in the Gray Herb; 378); Federal District (Pringle 8575), Tlalpam (Rose & Rose 11215); Puebla (Purpus 5709);

San Luis Tultitlanapa (Purpus 3554).

23. Cuscuta partita Choisy.

C. partita Choisy, Mém. Soc. Phys. et Hist. Nat. Genève 9:284. pl.5. f.3. 1841; and in DC., Prodromus 9:460. 1845.--Engelmann, Trans. Acad. Sci. St. Louis 1:487. 1859.--Progel in Martius, Fl. Brasiliensis 7. pl. 128. f.6. 1871.

Stems rather slender. Flowers glabrous, about 1.5-2 mm. long, on pedicels about as long as the flowers, in dense cymose panicles; calyx loose about and more or less spreading away from the corolla; lobes triangular-acute; corolla deeply furrowed along the line of stamen attachment, the corolla bulging outward between the furrows; stamen attachment evident; corolla lobes spreading, triangular-acute, nearly as long as the tube; scales fimbriate, as long as the tube, bridged at about a third of their height; stamens shorter than the lobes; anthers oval or roundish, shorter than the filaments; styles filiform, longer than the globose ovary; stigmas capitate. Capsule globose, bulging in the four quarters about the developing seeds; seeds about 1.2 mm. long, four ordinarily produced in each capsule, round, compressed; hilum oblong, transverse.

Type locality:- "Hab. in Brasiliâ apud Illheos." Type not seen. Range:- Found only from the Danish West Indies.

Specimens examined:- Danish West Indies: Island of Bonaire (Boldingh 7081); Island of Curaçao (Boldingh 5481).

24. Cuscuta Desmouliniana n. sp.

Stems slender. Flowers slightly papillate, about 2 mm. long, mostly pentamerous or less frequently tetramerous, on pedicels as long as or longer than the flowers; calyx lobes triangular or lanceolate, acute to acuminate, longer than the corolla tube and more

or less spreading at the tips; corolla campanulate; lobes longer than the tube, erect to spreading and sometimes reflexed in fruit, lanceolate, acuminate; scales shorter than the tube, oblong, sparingly fringed with short processes about the upper part, or reduced to wings on either side of the filament attachment; stamens shorter than the lobes; filaments longer than the small, oval to oblong anthers; styles longer than the small, globose ovary; stigmas capitate. Capsule with the marcescent corolla at the apex, globose, thin, circumscissile, usually 3-4 seeded; seeds roundish, ovoid, about 1 mm. long, compressed, angled, hilum short, oblong, oblique.

This species is named in honor of Charles Des Moulins, one of the monographers of this genus.

Type locality:- Hills near Altar, Sonora, Mexico.

Specimens examined:- Mexico, Sonora, Hills near Altar (Pringle 105, the type, in the Columbia College herb. now at the N.Y. Bot. Gard.) This specimen seems to be a mixture of the following two distinguishable varieties.

Cuscuta Desmouliniana typica n. var.

Lobes of the calyx and corolla triangular-acute to acuminate; scales fully developed, fringed.

Cuscuta Desmouliniana attenuiloba n. var.

Lobes of the calyx and corolla narrowly lanceolate, acuminate; scales reduced to wings on either side of the filament attachment.

25. Cuscuta umbellata Humboldt, Bonpland & Kunth.

C. umbellata Humboldt, Bonpland & Kunth, Nov. Gen. Sp. Pl. 3:95. 1818.--Choisy, Mém. Soc. Phys. et Hist. Nat. Genève 9:284. 1841; and in DC., Prodromus 9:460. 1845.--Engelmann, Trans. Acad. Sci. St. Louis 1:487. 1859.--Progel in Martius, Fl.

Brasiliensis 7. pl. 128. f.7 & 8. 1871.

C. parviflora Willdenow in Engelmann, Trans. Acad. Sci. St. Louis 1:487. 1859. in synon.

Stems slender. Flowers glabrous or infrequently slightly puberlent, 2-6 mm. long, pentamerous, on pedicels longer or shorter than the flowers, forming rather dense compound cymes, the ultimate umbellate divisions of 3-7 flowers; calyx turbinate, as long as or longer than the campanulate corolla; lobes ovate-triangular, acute to acuminate; corolla lobes as long as or longer than the tube, reflexed, lanceolate or somewhat oblong, acute to acuminate; scales somewhat obovate or spatulate, moderately fringed with medium length processes, reaching the filaments or slightly exserted, or shorter in one variety, bridged at about a third or less of their height; stamens shorter than the lobes; anthers oblong to oval, shorter than or equalling the filaments; styles longer than the globose ovary; stigmas capitate. Capsule globose, depressed, with a ring or collar of thickened knobs about the intrastylar aperture, circumscissile, surrounded by the withered corolla; seeds about 1 mm. long, angled, oblique, oval, yellowish; hilum oblong, linear, transverse.

Cuscuta umbellata typica.

Flowers usually not more than 3 mm. long; corolla lobes lanceolate, reflexed; scales ovate, as long as or longer than the tube.

Type locality:- Between Queretaro and Salamanca, Mexico.

Range:- The southern United States, Mexico and the Greater Antilles.

Specimens examined:- Foot of Rocky Mountains (James, on Long's exped.): New Mexico: (Stanley 7849; Wright 1636; 1627; 1639; 371; Bigelow in 1851; Gregg; Mulford 1078a); Las Cruces (Wooton in 1895); Dona Ana Co. (Wooton in 1895 and in 1904; Wooton & Stanley 3986); Gila Valley (Green 12953); Gila (Schott); Gila River (Green

in 1880): Arizona: Ft. Verde (Mearns in 1887, somewhat fleshy and puberlant); Santa Rita Grass Preserve (Goodding 2482); Beaver Creek (Purpus 8274); Prescott (Fernon 1896); San Pedro River (Hays): Texas: Laredo (Neally 100; 100a; Mackenzie 81); southwestern Texas (Palmer 916); western Texas (Wright 510): Colorado: Fremont Co. (Brandegee 407): Southern California: (Lemmon): Florida: (Garber 1883; Simpson 361, the flowers nearly sessile): Mexico: Mexico Boundary Line (Mearns 640); State of Durango (Pittier 497); State of Chihuahua (Palmer 500; Pringle 783); State of Tamaulipas (Palmer 441; 501; 511), Camargo (Gregg); Oaxaca, Cuicatlan (Rusby 129, somewhat fleshy puberlent); State of Sonora (Wright 695; Coulter 1010), Guaymas (Palmer 173); State of Coahuila (Palmer 471), Saltillo (Gregg 490); between Queretaro & Salamanca (Humboldt, the type, a fragment in the Engelmann herb.): West Indies: Cuba: (Wright 3107); Porto Rico: (Britton & Shafer 1866; Britton, Cowell & Brown 4794; 4978); Punta Melones to Punta Casabe (Britton, Cowell & Brown 4676); Cayo Mertos (Britton, Cowell & Brown 4978); Jamaica: (Broomfield in 1847; Britton 3102), Kingston (Britton & Hollick 1737, somewhat glandular).

Cuscuta umbellata reflexa (Coulter) n. comb.

C. californica reflexa Coulter, Contrib. U.S. Nat. Herb. 1:45. 1890.

Flowers large (4-6 mm. long), corolla lobes lanceolate, upright to reflexed; scales profusely fringed about the apex, spatulate their lower half so firmly adherent to the tube as to render it difficult to detach for study. The large size of the flowers and compact clusters distinguish this variety.

Type locality:- Roma, Texas. Range:- Texas, Arizona and northern Mexico.

Specimens examined:- Texas: Roma (Neally 339, the type of C. californica reflexa, in the U.S. Nat. Herb. as type sheet 1,193):

Arizona: San Carlos (Ebert in 1893); Tucson (Griffiths 2044; Engelmann in 1880): Mexico: Lower California, Cape region (Brandegee in 1902), west coast (Brandegee in 1893); Carduana (Brandegee in 1893); Sinaloa, Culiacan (Brandegee in 1904); Sonora, Pinacate Mts. (McDougall 26).

Cuscuta umbellata reducta n. var.

Flowers more delicate, smaller, ordinarily tetramerous or trimerous, scales short fringed, and only reaching the middle of the tube.

Type locality:- Socorro, N.Mexico. Range:- Southwestern New Mexico and Puebla, Mexico?.

Specimens examined:- New Mexico; Socorro (Plant in 1895, the type, in the N.Y. Bot. Gard. herb.); Sierra Co. (Metcalf 1290): Mexico: Puebla, Tehuacan (Pringle 6297)?.

Cuscuta umbellata dubia n. var.

Stems very slender. Flowers about 2 mm. long; calyx lobes triangular, acute, forming angles at the sinuses; corolla lobes about equal to the tube, spreading, triangular-oblong, acute.

This specimen, which is fragmentary, appears to be distinct. The stems are the most slender seen in any of the species.

Type locality:- Mexico: Sonora, Guaymas.

Specimens examined:- Mexico: Sonora, Guaymas, on the sea beach (Palmer 1209, the type, in the U.S. Nat. Herb. as sheet 474, 815).

26. Cuscuta gracillima Engelmann.

C. gracillima Engelmann, Trans. Acad. Sci. St. Louis 1:488. 1859.

Stems very slender, disappearing early from between the flower clusters. Flowers smooth or papillate, about 2 mm. long,

on pedicels sometimes shorter but mostly longer than the flowers, in dense clusters; calyx turbinate; lobes triangular, lanceolate, acute to acuminate. longer than the tube of the corolla; corolla campanulate; lobes about as long as or slightly longer than the tube, triangular to lanceolate, acute; scales ovate, fringed, longer than the tube, or much reduced, bridged at about or below the middle; stamens longer or shorter than the lobes; filaments slender; anthers oblong, oval, somewhat versatile; ovary small, globose; styles capillary, many times the length of the ovary. Capsule tardily and irregularly circumscissile, depressed-globose, thin; seeds about 1 mm. long, one to four in a capsule, ovate, somewhat oblique; hilum oblong, oblique.

Cuscuta gracillima subtilis (Chaubard) n. comb.

C. foetida Hooker & Arn. Bot. Beechey 304. 1840. non HBK.

C. subtilis Chaubard in Engelmann, Trans. Acad. Sci. St. Louis 1:489. 1859. in synon.

Flowers glabrous, pentamerous; scales well developed; stamens longer than the corolla lobes; the typical variety of the species.

Type locality:- Mexico. Range:- Central Mexico.

Specimens examined:- Mexico: (Saubert?, the type, a fragment in the Engelmann herb.); Jalisco, Manzanillo (Palmer 949); Sinaloa, Mazatlan (Wright 1364; Rose, Standley & Russell 13727a; 13804); State of Morelos, Cuernavaca (Pringle 6189), valley near Yautepic (Pringle 8716).

Cuscuta gracillima esquamata n.var.

Flowers frequently tetramerous; scales lacking or reduced to but a few short processes; corolla somewhat glandular.

Type locality:- Mexico: Lower California, El Taste

Specimens examined:- Mexico: Lower California, El Taste (Brandegee in 1893, the type, in the Univ. California herb.)

Cuscuta gracillima saccharata Engelmann.

C. gracillima saccharata Engelmann, Trans. Acad. Sci. St. Louis 1:489. 1859.

C. sidarum Liebmann in Engelmann, ibid. in synon.

Stamens not exceeding the corolla lobes; scales somewhat shorter than in var. subtilis but fully developed; flowers slightly smaller, densely papillose.

Type locality:- Oaxaca, Mexico. Range:- Southwestern Mexico.

Specimens examined:- Mexico: Oaxaca (Liebmann, taken as the type, a fragment in the Engelmann herb.); Guerrero, Acapulco (Palmer 51).

Cuscuta lacerata n. sp.

Stems slender. Flowers glabrous, pentamerous, about 2 mm. long, on pedicels as long as or longer than the flowers in dense, congested, paniculate cymes, the ultimate divisions umbellate; calyx exceeding the shallow, campanulate corolla; lobes somewhat uneven, lanceolate, acuminate, with scattered deep serrations; corolla lobes much exceeding the tube, lanceolate, acuminate, lacerated; scales exserted, somewhat spatulate, fringed, bridged at about a quarter of their height; stamens shorter than the lobes; anthers ovate-oblong, rather shorter than the slightly tapering filaments, somewhat versatile; ovary globose, slightly thickened at the apex; styles slender, much longer than the ovary. Capsule globose, with a slightly thickened collar about the intrastylar aperture; bearing the withered corolla about its apex; seeds one to four in a capsule, oval, somewhat compressed; hilum small, transverse?.

Type locality:- Mexico, Cuicatlan.

Specimens examined: Mexico: Cuicatlan (Smith 406, the type in the Gray Herbarium).

28. Cuscuta deltoidea n. sp.

Stems very slender. Flowers glabrous, pentamerous, short (mostly less than 2 mm. long), on pedicels much longer than the flowers in congested cymose-paniculate clusters; calyx shallow; lobes short, broadly ovate, obtuse, overlapping, somewhat verrucose; corolla campanulate; lobes triangular-ovate, acute, becoming reflexed; scales shorter than the tube or reaching the filaments, fringed with medium length processes, bridged at about their middle; stamens slightly longer or about equalling the corolla lobes; anthers oval, shorter than the filaments, slightly versatile; styles longer than the globose ovary, becoming exserted; stigmas capitate. Capsule depressed-globose, with a thickened collar about the intrastylar aperture, circumscissile; mature seeds not seen.

This species differs from C. gracillima, which it resembles somewhat, in the more triangular-ovate corolla lobes and the short, broadly obtuse overlapping calyx segments. It differs from C. pentagona in its shorter scales, longer stamens, circumscissile capsule and type of inflorescence.

Type locality:- Mexico: Jalisco, Manzanillo.

Specimens examined:- Mexico: Jalisco, Manzanillo (Palmer 948, the type, in the U.S. Nat. Herb. as sheet 208,677).

29. Cuscuta tuberculata Brandegee.

C. tuberculata Brandegee, Univ. Calif. Bot. Publ. 3:389. 1909.

Stems slender. Flowers 2.5-4 mm. long, pentamerous, on pedicels longer or shorter than the flowers, in umbellate racemose clusters; calyx about half as long as the cylindrical corolla tube; lobes triangular, acute, keeled, giving the calyx somewhat of a squarish appearance; corolla lobes equal to or shorter than the tube,

upright, triangular, acute; the basal portion of the corolla papillate, especially that part enclosed by the calyx; scales about reaching the middle of the tube, ovate, fringed with short processes, bridged at about the middle; stamens shorter than the lobes or slightly longer in some specimens; anthers oblong, linear, shorter than or equalling the filaments; ovary small, globose, pointed, with a thickened ring about the intrastylar aperture; styles much longer than the ovary, exserted. Capsule globose, umbonate, circumscissile, with the withered corolla capping the capsule; mature seeds not seen.

Type locality:- "In the cape region of Baja California at Pescadero." Range:- Lower California to New Mexico.

Specimens examined:- Mexico: Lower California (Brandegee in 1915); Santa Margarita Island (Brandegee 3); San José (Brandegee 404; Grabendorfer in 1899); Pescadero (Brandegee in 1893, the type, in the Univ. California herb.); west coast of cape region (Brandegee in 1893); Sonora, Northwestern Mts. (Pringle in 1884); Bavispe (Hartman 179): New Mexico: Gila Valley (Green, 3 collections in 1880).

30. Cuscuta leptantha Engelmann.

C. leptantha Engelmann, Trans. Acad. Sci. St. Louis 1:489. 1859.

Stems very slender. Flowers 3-4.5 mm. long, tetramerous or pentamerous, on pedicels as long as or longer than the flowers, in umbellate clusters; calyx short, campanulate, lobes triangular-ovate, acutish, somewhat fleshy, papillose, about reaching the middle of the corolla tube; corolla cylindrical, fleshy and papillose in the basal portion; lobes nearly as long as the tube, upright to reflexed, slightly fleshy, triangular, lanceolate, acute; scales oblong, truncated or somewhat deltoid, shorter than the tube, fringed with

short processes, bridged at about a quarter or a half of their height; stamens somewhat shorter than the lobes; anthers oval, shorter than the slender filaments; styles slender, much longer than the ovoid ovary, exserted; stigmas capitate. Capsule globose, slightly umbonate, two to four seeded, circumscissile, capped with the withered corolla; seeds about .8 mm. long, ovate, brown, oblique, compressed, angled; hilum short, oblique or transverse.

Cuscuta leptantha typica.

Lobes of the corolla ordinarily four (infrequently five), upright; scales oblong, truncated, sparingly fringed about the apex, bridged at about a quarter to a third of their height.

Type location:- "Western Texas". Range:- Texas and New Mexico to central Mexico.

Specimens examined:- Texas: Western Texas to El Paso (Wright 522, taken as the type, in the Engelmann herb.); Prairies of the Leona (Wright in 1852); Eagle Pass (Havard 4; Howard in 1888): New Mexico: Rio Gila (Green 275): Mexico: Sinaloa, Culiacan (Rose, Standley & Russell 14929).

Cuscuta leptantha Palmeri (Watson) n. comb.

C. Palmeri Watson, Proc. Amer. Acad. Arts & Sci. 24:64. 1889.

Lobes of the corolla usually five and reflexed; scales more deltoid and copiously fringed, bridged at about the middle.

Type locality:- "At Los Angeles Bay, Lower California". Range:- Lower California.

Specimens examined:- Mexico: Lower California, Los Angeles Bay (Palmer 544, the type, in the Gray Herb.); La Paz (Palmer 16, Brandegee 406).

31. Cuscuta polyanthemos Schaffner. n.sp.

C. polyanthemos Wilh. Schaffner in herb.

Stems very slender. Flowers glabrous, 4-5 mm. long, pentamerous or tetramerous, in umbellate clusters on pedicels usually two or more times the length of the flowers; calyx short, not over half as long as the corolla tube, its lobes triangular, acute; corolla tube 4-5 mm. long, cylindrical, slightly tapering towards the base; lobes triangular, lanceolate, acute, spreading to reflexed, about half as long as the tube; scales shorter than the tube, reaching about the middle, sparingly fringed with short processes, bridged at about one-third their height; stamens shorter than the lobes; anthers oblong-oval, shorter than the slightly subulate filaments; ovary globose, slightly pointed through a thickened collar about the intrastylar aperture; styles many times the length of the ovary, exserted; stigmas capitate. Capsule globose, slightly pointed, with the withered corolla carried at the apex, somewhat glandular, circumscissile, leaving the obcordate dissepiment in the calyx; seeds about 1 mm. long, usually four in each capsule, oval, angled; hilum oblong, oblique.

From C. leptantha, with which this species is closely allied, it differs mainly in the greater length of flowers and pedicels.

Type locality:- Mexico: Sinaloa, Culiacan.

Specimens examined:- Mexico: Sinaloa, Culiacan (Schaffner, without date or number, the type, in the N.Y. Bot. Gard. herb; Brandegee in 1904 under the name of C. Palmeri.)

Subsection Platycarpae Engelmann.

Cuscuta § Platycarpae Engelmann, Trans. Acad. Sci. St. Louis 1:491. 1859.

Cuscuta § Oxycarpae Engelmann, ibid. 499.

Flowers membranous or fleshy, mostly pedicellate, not subtended by numerous bracts (in C. denticulate one or two bracts may

be present at base of the flower cluster).

Key to the species.

Capsule globose, more or less depressed; flowers membranous or fleshy; scales present.

Flowers mostly smooth, not particularly fleshy or papillate except in one variety.

Corolla remaining at the base of the capsule when mature.

Corolla lobes obtuse; scales reaching the filaments; pentamerous - - - - - - - - - - - - - 32. C. glandulosa.

Corolla lobes triangular, acute; scales reduced to a few processes about the apex; mostly tetramerous - - 33. C. polygonorum.

Corolla lobes acute, with inflexed tips; scales prominent; pentamerous.

Flowers about 2-3 mm. long, scales rather deeply fringed, exceeding the length of the tube - 34. C. pentagona.

Flowers 2.5-5 mm. long, scales rather shallowly fringed, not reaching the filaments - 35. C. plattensis.

Corolla carried at the apex of the capsule like a hood; mostly tetramerous - - - - - - - -36. C. Cephalanthi.

Corolla surrounding the capsule; calyx lobes not overlapping; pentamerous.

Calyx lobes not reaching the middle of the corolla, deltoid - - - - - - - - - 37. C. racemosa chiliana.

Calyx lobes usually exceeding the middle of the corolla, ovate- - - - - - - - - - 38. C. decipiens.

Flowers fleshy, cells more or less lens shaped giving the flowers a slightly papillate appearance, tips of corolla

lobes inflexed.

Flowers mostly tetramerous; scales rudimentary, represented by toothed wings - - - - - - 39. C. Coryli.

Flowers mostly pentamerous; scales prominent - - 40. C. indecora.

Capsule globose or conic; scales rudimentary, represented by very short bridges and the slight beginning of a wing along the stamen attachment in some specimens - - - - - - - - - -41. C. californica.

Capsule globose-ovoid to conic or long beaked; scales present, prominent, or but fringed wings along stament attachment.

Flowers about 1 mm. long, frequently tetramerous; corolla lobes with inflexed tips - - - - - - - - - - - - - - 42. C. Harperi.

Flowers larger, nearly always pentamerous; corolla lobes not inflexed at the tips.

Capsule globose, flask-shaped with a long neck; flowers relatively large - - - - - - - - - - - - 43. C. rostrata.

Capsule globose-ovoid or conic.

Calyx lobes ovate, mostly even; capsule globose-ovoid, more or less pointed.

Capsule 3-5 mm. wide; styles usually at least one-third the length of the capsule-44. C. Gronovii.

Capsule 4-9 mm. wide; scales truncated or bifid; styles relatively shorter, usually about one-fourth the length of the capsule - - 45. C. curta.

Calyx lobes orbicular, denticulated; capsule globose-ovoid - - - - - - - - - - - - - - -46. C. denticulata.

Calyx lobes deltoid or lanceolate, acute to acuminate.

Scales reaching the filaments, bridged at about the middle - - - - - - - - - - - - - - - - 47. C. Veatchii.

Scales shorter than the tube, shallowly fringed or reduced to wings, bridged below the middle.

Calyx lobes shorter than the tube, overlapping; flowers 5-6 mm. long - - - - 48. C. subinclusa.

Calyx lobes equalling the tube, not overlapping; flowers 2-4.5 mm. long. - - - - - 49. C. salina.

32. Cuscuta glandulosa (Engelmann) Small.

C. glandulosa (Engelmann) Small, Flora S.E. U.S. 969. 1903.

C. obtusiflora glandulosa Engelmann, Trans. Acad. Sci. St. Louis 1: 492. 1859.

Stems medium. Flowers glabrous, about 2 mm. long, pentamerous, subsessile to sessile in globular compact clusters; calyx shorter than or nearly as long as the corolla tube; lobes ovate, obtuse, slightly overlapping; corolla campanulate; lobes shorter than the tube, ovate, obtuse, upright to spreading, often becoming reflexed as the fruit matures; scales as long as the tube, fimbriate, prominent, or somewhat shorter and slightly bifid; stamens shorter than the lobes; filaments longer than the oval anthers and somewhat subulate; styles longer than or equal to the globose ovary. Capsule depressed-globose, angled by the developing seeds; seeds ordinarly two to four in each capsule, brown, oval; hilum oblique or transverse and at one side, oblong.

The whole flower is more or less dotted with glandular-like cells and reddish. This species, which in many respects resembles C. polygonorum, differs in the pentamerous flowers, with more prominent scales and in the obtuse corolla lobes.

Type locality:- Georgia. Range:- Throughout the southern United States from California to Florida and the Greater Antilles

and northern Mexico.

Specimens examined:- Texas: San Marcos (Neally 92); Dallas (Reverchon in 1878); Rio San Pedro (Bigelow in 1850; Schott in 1851); western Texas to El Paso (Wright in 1849): California: San Bernardino Co. (Parish), San Bernardino (Parish 1898): Indian Territory: Sapulpa (Bush 1405): Louisiana: (Tainturier; Langlois 237): Georgia (Boykin in 1838, taken as the type, in the Engelmann herb.): Florida: (Rugel 400); Jamony (Rugel in 1843); St. George's Island (herb. Chapman in 1863): West Indies: Porto Rico, Sierra de Naguabo (Britton, Britton & Cowell 2109): Cuba: (Wright in 1865), Habana (Wilson 1111, 1129): Mexico: Durango, Durango (Palmer 605).

33. Cuscuta polygonorum Engelmann.

C. polygonorum Engelmann, Amer. Journ. Sci. & Arts 43:342. pl.6. f.26-29. 1842.--Choisy in DC., Prodromus 9:461. 1845.

C. chlorocarpa Engelmann in Gray, Manual of Botany 350. 1848; and Trans. Acad. Sci. St. Louis 1:494. 1859.--Britton & Brown, Illustr. Flora 3:28. f.2959. 1898; and 2 ed. 3:49. f. 3445. 1913.--Matthew, Bull. Torr. Bot. Club 20. pl.165. f.7. 1893.

Stems medium to slender. Flowers glabrous, about 2-2.5 mm. long, mostly tetramerous (infrequently tri- or pentamerous), subsessile, in compact, dense, glomerulate clusters; calyx lobes triangular, obtuse, as long as or longer than the corolla tube, corolla short campanulate, lobes triangular-acute, upright, as long as or slightly longer than the corolla tube; scales oblong, about reaching the filaments or shorter, bifid, their processes few and short, about the upper portion, bridged at about a quarter of their height; stamens shorter than the lobes; anthers oval, pollen sacs sometimes separated by the connective, shorter than the subulate fil-

C. arvensis Beyrich in Hooker, Fl. Bor.-Am. 2:77. 1834. as synonym without description.--Engelmann in Gray, Manual of Botany 2 ed. 336. 1856; and in Trans. Acad.Sci. St. Louis 1:494. 1859.--Hillman, Nev. Agr. Exp. Sta. Bull.n.15. f.4. 1892.--Matthew, Bull. Torr. Bot. Club 20. pl. 164. f.3. 1893.--Piper, Wash. Agr. Exp. Sta. Bull.n.8. f.2. 1893.--Britton & Brown, Illustr. Flora 3:28. f.2958. 1898; and ed.2. 3:49. f.3444. 1913.

Epithymum arvense (Beyrich) Nieuwland & Lunell, Amer. Mid. Nat. 4:511. 1916.

Stems slender. Flowers 2-3 mm. long, glabrous to papillate or verrucose, pentamerous, on pedicels as short as or longer than the flowers in dense globular clusters; calyx lobes broad, obtuse, sometimes overlapping and angled; corolla broad, campanulate, lobes as long as or slightly longer than the tube, reflexed or spreading, with the tips acute and inflexed; scales longer than the tube, broad, ovate, deeply fringed, particularly the upper portion; stamens shorter than the lobes; anthers shorter than the filaments, slightly versatile, ovoid, elliptical; styles as long as or slightly longer than the globose ovary. Capsule globose, more or less depressed, the withered corolla remaining at the base; seeds 1-1.2 mm. long, light brown, usually four in a capsule, obovate or oval, compressed; hilum short, linear, oblique or transverse.

Key to the varieties.

Calyx lobes overlapping, forming angles at the sinuses; flowers relatively small - microcalyx.

Calyx lobes not at all or but slightly overlapping and not forming angles at the sinuses; flowers larger.

aments which are situated more or less directly in the sinuses; styles shorter than the globose, depressed ovary, becoming subulate and divergent. Capsule globose, depressed, appearing cubical about the developing seeds; intrastylar aperture large, rhombic; seeds about 1.3 mm. long, yellowish brown, roundish, slightly rostrate and compressed; hilum oblong, linear, transverse to oblique.

Type locality:- "West of St. Louis." Range:- From Maryland and the District of Columbia west to Minnesota and Nebraska and south to Tennessee and possibly to Texas.

Specimens examined:- Maryland: Little Falls of Potomac (Mohr in 1882); Glen Echo (Hillman); Chesapeake Bay region (Shull 393): Delaware: (Tatnall): District of Columbia: Washington (Chase 2532; Steele in 1900): Pennsylvania: Lancaster Co. (Porter in 1863): Ohio: Ottawa Co. (Moseley in 1898); Florence (Moseley in 1897); Crawford Co. (Sears in 1916): Tennessee: Nashville (Gattinger in 1881): Illinois: Elgin (Umbach in 1895); Mt. Carmel (Schneck in 1905, in 1897, on Pataka Island near Mt. Carmel in 1879 and one collection without date); Wabash Co. (Schneck in 1880); Urbana (Clinton 30438; Yuncker 1010; 1000a, b, c & d); Taylorville (Andrews in 1892 and in 1898); Peoria (Brendel in 1892); St. Clair Co. (Eggert in 1878): Wisconsin: Green Bay marsh east of Fox River (Schuette 95-11-7); Beaver Dam (Chandler 485); Madison (Cheney in 1889): Minnessota: Winona (Holzinger in 1888): Nebraska: Exeter (Wibbe in 1889); Lincoln (Hannah in 1916): Kansas: Riley Co. Norton 358).

34. Cuscuta pentagona Engelmann.

C. pentagona Engelmann, Amer. Journ. Sci. & Arts 43:340. pl.6. f. 22-24. 1842.--Choisy in DC., Prodromus 9:461. 1845.

Flowers smooth, not verrucose or pubescent- - - - -calycina.

Flowers more or less verrucose or pubescent.

Flowers more or less verrucose - - - - - - - verrucosa.

Flowers papillose-pubescent - - - - - - - - - pubescens.

Cuscuta pentagona microcalyx Engelmann.

C. pentagona microcalyx Engelmann, Amer. Journ. Aci. & Arts 45:76. 1845.

C. arvensis pentagona Engelmann, Trans. Acad. Sci. St. Louis 1:494. 1859.

C. globularis Nuttall in Engelmann, ibid. in synon.

Smallest of the varieties. Calyx lobes smooth, roundish-triangular, overlapping at the sinues forming angles.

Type locality:- Beardstown, Illinois. Range:- From Massachusetts to Florida and westward to Montana.

Specimens examined:- Fort Smith to the Rio Grande (Bigelow 1; 9): Massachusetts: Winchester (Bartlet 696; Rich in 1896); Cambridge (Weatherby in 1911): Connecticut: Oxford (Harger in 1891); Simsbury (Bissell in 1904): District of Columbia: Washington (Blanchard in 1890; Hillman in 1904; Holm in 1893); Eckington (Boettcher 122); Takoma Park (Painter 745): New Jersey: (VanSickle in 1894); Landisville (Gross in 1882); Cape May (Martindale in 1877); Cumberland Co. (Parker in 1866); Ocean Co. (Mackenzie 4782): Virginia: Suffolk (Kearney 1583); Luray (Steele 155); Lake Smith (Hitchcock in 1905); Norfolk (Hitchcock in 1905); Bedford Co. (Curtiss 5840): New York: Long Island (Bisky in 1886): Pennsylvania: Susquehanna (Ely in 1888): Delaware: (Canby in 1863); Townsend (Chickering in 1873); Wilmington (Canby in 1895); Pencader (Tatnall in 1884): Maryland: Spencerville (Bond in 1891); Crisfield (Holmes 17188); College Park

(Blodgett in 1903): N. Carolina (Beyrich in 1845, the type? of C. arvensis, in the Engelmann herb; McCarthy in 1885; Ashe; Thaxter in 1887); Hillsborough (Curtiss in 1843): S. Carolina: (Ravenel); Aiken (Ravenel in 1869): Florida: (Rugel 400a; 400b); St. Marks (Rugel in 1843); Jacksonville (Keeler in 1889; Curtiss 2188); Brevard Co. (Nash 2283); Penscacola (Mohr in 1874); Carrabelle (Curtiss 5881); Biscayne Bay (Chapman): Alabama: Mobile (Mohr in 1888); Valley Head (Ruth 477; 492): Georgia: DeKalb Co. (Eggert in 1897; Small in 1893); Whitfield Co. (Wilson 138); Stone Mt. (Engelmann in 1876): Mississippi (Tracy in 1892): Tennessee (Gattinger in 1879); Cocke Co. (Kearney 843); Nashville (Killebrew in 1885); Knoxville (Ruth 169); Rutherford (Eggert in 1897): Kentucky: Bowling Green (Price in 1898): Indiana: Gibson Co. (Schneck in 1906); Crisfield (Holmes 17188): Illinois: Peoria (McDonald in 1904); Freeport (Johnson in 1900); Beardstown (Geyer in 1842, the type, in the Engelmann herb.); Henderson Co. (Patterson); Cook Co. (Beal in 1869); West Pullman (Lansing 2846); Oregon (Hill 128-1905); Kankakee (Hill 76-1871); Glencoe (Eggert in 1879): Minnessota: Minneapolis (Sheldon in 1891); S. Dakota: (Skinner 200); Bad Lands (Williams in 1891); Pennington Co. (Over 1907): Nebraska: (Hayden in 1853-54); Ewing (Bates 698): Iowa: Ames (Hitchcock): Missouri: Eagle Rock (Bush 63); Cockrell (Bush 10); Lee's Summit (Bush 138); St. Louis (Eggert in 1879); Springfield (Standley 8980); Dent Co. (Tracy 17189); Iron Mt. (Trécul in 1848); Hillsborough (Riehl in 1848); Allentown (Letterman in 1875); Jefferson Co. (Eggert in 1891; and in 1896); Webb City (Palmer 432); St. Francis Co. (Russell in 1897); Willard (Blankinship in 1889); Malden (Bush in 1893); Shannon Co. (Bush 1007; 1062); McDonald Co. (Bush in 1892): Indian Territory: (Butler 3); Cickasaw Nation

(Sheldon in 1891); Colbert's Station (Sheldon 21): Colorado: Paradox (Walker 348): Montana: Glendine (Ward in 1883).

Cuscuta pentagona calycina Engelmann.

C. pentagona calycina Engelmann, Amer. Journ. Sci. & Arts 45:76.1845.

C. arvensis calycina Engelmann, Trans. Acad. Sci. St. Louis 1:495. 1859.

Flowers larger; calyx lobes ovate or roundish, shorter than or longer than the corolla, not at all or but slightly overlapping and not angled at the sinuses.

Type locality:- Texas. Range:- From Virginia to the Greater Antilles and westward to Saskatchewan, Manitoba, California, Texas and northern Mexico.

Specimens examined: (Wooton 2749); Lat. 41° (Harbour 464): Virginia: Nansemond Co. (Heller 1135): Tennessee: Knoxville (Ruth in 1893): Indiana: Clarke (Umbach in 1898): N. Dakota: Big Stone Lake (Griffiths & Slosser 235): S. Dakota: Brookings (White); Fall River Co. (Visher 2598): Nebraska: Scotts Bluff Co. (Rydberg 264): Missouri: Courtney (Bush 3013; 5855); Carthage (Bush & Palmer 3063); Kansas City (Bush 1750; 4068): Kansas: Manhattan (Kellerman 50): Arkansas : Eureka Springs (without designation of collector, in 1898): Colorado: Grand Junction (Hedgcock in 1901); Boulder (Daniels 696); Naturita (Payson 588): Nevada: Reno (Hillman): Montana: Bozeman (Blankinship 407): Utah: (Jones 5482b; 5653; Eastwood 91; Rydberg & Garrett 9918; 10014; 10013; Hedrick in 1899); Salt Lake City (McKinney in 1916): Washington: Klickitat Co. (Suksdorf 2852); Waitsburg (Horner 639): Oregon: Mouth of the Walla Walla River (Geyer 674); Multnomah Co. (Howell 336): California: Santa Clara Co. (Abrams 2230; Baker 1761); Rendondo (Grant in 1901; McClatchie

in 1892); southern California (Grant 3629); Mariposa (Congdon in 1902); Bouldin Island (Brandegee): Arizona: (Rusby 245; 295); Camp Lowell (Rothrock 708); Tucson (Pringle 144; 13797; and in 1891); Solomonville (Goodding 509); Flagstaff (McDougall 378); Ash Creek (Rothrock 311); Cosnino (Jones 4032): New Mexico: (Rusby 85; and in 1880); Frisco River (Wooton in 1900); Chavez (Wooton in 1892); Dona Ana Co. (Wooton & Stanley 3988 and in 1906); Mangas Springs (Metcalf in 1903); Alberque (Jones 4116 and in 1884; Herrick in 1904); La Luz (Wooton in 1905); San Juan Co. (Standley 6958): Texas: (Thuron in 1890; Lindheimer 664; 126, taken as the type, in the Engelmann herb; Wright in 1847); Dallas (Reverchon in 1880); Concho (Havard 2); San Marcos (Stanfield in 1898): Canada: Assiniboia (Macoun 11852); Saskatchawan (Drummond); Manitoba, Morris (Macoun 23972): Mexico: State of Jalisco (Pringle 3111); Chihuahua, Chihuahua (Palmer 382); Lower California, San Jorge (Brandegee 4); Baja (Brandegee): West Indies: Cuba (Wright 1659); Habana (Leon 7707; Leon & Eckman 4270): Bahamas, Andros (Wight 238); Jamaica, Claredon (Britton 3798): Porto Rico (Britton, Britton & Cowell 2109); Arecibo to Utuado (Britton & Cowell 306).

Cuscuta pentagona verrucosa (Engelmann) n. comb.

C. verrucosa Engelmann, Amer. Journ. Sci. & Arts 43: 341. pl. 6. f. 25. 1842.--Choisy in DC., Prodromus 9:461. 1845.

C. verrucosa glabrior Engelmann, l.c. 341.

C. arvensis verrucosa Engelmann, Trans. Acad. Sci. St. Louis 1:495 1859.

Pedicels usually longer than in the other varieties, equalling the flowers or longer; calyx lobes more triangular, obtuse, usually shorter than the corolla, fleshy verrucose; capsule somewhat verrucose to papillate.

Type locality:-Texas. Range:- Louisiana, Indian Territory, Texas and northern Mexico.

Specimens examined:- Louisiana: Sulphur (Palmer 7709): Indian Territory: Limestone Gap (Butler 3; 4); Between Fts. Cobb & Arbuckle (Palmer 202): Texas: (Drummond III 247, taken as the type, in the Engelmann herb; Ruth 502; Lindheimer 127; 473); Corpus Christi (Heller 1549); Dallas (Reverchon in 1878; Hall 492; 493); Galveston island (Joor in 1877); San Antonio (Palmer 12914; Larrabee in 1900): Mexico: (Berlandier 2457); State of Coahuila (Palmer 723), Saltillo (Palmer 218; 307; 730), Parras (Gregg 401; 417); San Luis Potosi, San Luis Potosi (Berlandier in 1827); States of Coahuila & Neuvo Leon (Palmer 919).

Cuscuta pentagona pubescens (Engelmann) n. comb.

C. arvensis pubescens Engelmann, Trans. Acad.Sci. St. Louis 1:495. 1859.

All parts of the flower more or less papillate-pubescent.

Type locality:- Western Texas. Range:- New Mexico and Texas.

Specimens examined:- New Mexico: (Wright 1631; 1635): Texas: (Wright 2; Lindheimer in 1847, taken as the type, in the Engelmann herb.); El Paso (Wright 519; 523); Bexar Co. (Jermy 34); Llano Co. (Neally 84); On the Pedernales river (Lindheimer in 1847); Along the Pecos (Wright 574).

35. Cuscuta plattensis Nelson.

C. plattensis Nelson, Bull. Torr. Bot. Club 26:131. 1899.

Stems medium to slender. Flowers glabrous, 2.5-5 mm. long, pentamerous, on pedicels about equal to the flowers in panicled cymes; calyx shorter than the corolla tube; lobes triangular, obtuse, slightly overlapping; corolla tube broadly campanulate; lobes about

equalling the tube, triangular, acute, (not "short-ovate, obtuse, about half the length of the broadly campanulate tube"), slightly irregular in some, spreading or reflexed, with the tips inflexed; scales shorter than the tube, slightly spatulate, copiously fringed with short processes; stamens shorter than the lobes; anthers oval, about equal to the subulate filaments; ovary depressed-globose, verrucose and thickened about the intrastylar aperture; styles slightly unequal, about equal to the ovary or shorter; Capsule depressed-globose; seeds one to four in a capsule; about 1-1.5 mm. long, oval or obovate, robust; hilum short, linear, transverse.

This species is very closely related to C. pentagona and perhaps merges with some of the larger forms of variety calycina. It seems to differ in the shorter scales and shorter processes and the rather larger flowers.

Type locality:- "In cañon of Platte". Range:- Wyoming and Washington.

Specimens examined:- Wyoming: Platte Cañon (Nelson 2768, the type, in the Rocky Mt. Herb. Univ. of Wyoming); Uva (Nelson 2741, mixed with C. indecora on some sheets); Converse Co. (Nelson 9118): Washington: Klickitat Co. (Suksdorf 2852).

36. Cuscuta Cephalanthi Engelmann.

C. Cephalanthi Engelmann, Amer. Journ. Sci. & Arts 43:336. pl. 6. f.1-6. 1842.--Matthew, Bull. Torr. Bot. Club 20. pl. 164. f.6. 1893.--Britton & Brown, Illustr. Flora 3:29. f.2962. 1898; 2 ed. 3:50. f.3448. 1913.

C. tenuiflora Engelmann in Gray, Manual of Botany 350. 1848; and in Trans. Acad. Sci. St. Louis 1:497. 1859.

Epithymum Cephalanthi Nieuwland & Lunell, Amer. Mid. Nat. 4:511.1916.

Stems medium. Flowers glabrous, about 2 mm. long, commonly tetramerous, less frequently tri- or pentamerous, sometimes more or less glandular; calyx shorter than the corolla tube, deeply divided; lobes oblong-ovate, obtuse; corolla cylindric-campanulate, becoming somewhat urceolate as the capsule matures; lobes ovate, obtuse, erect to spreading, much shorter than the tube; scales oblong, narrow, fringed with scattered processes, reaching the filaments, bridged at from a quarter to a third of their height; stamens mostly equal to or slightly shorter than the lobes; anthers oval to round, about equal to the stoutish filaments; styles equal to or slightly longer than the globose somewhat depressed ovary. Capsule depressed-globose, capped by the persistant, withered corolla; seeds about 1.6 mm. long, light brown, globose, ovate or round, slightly oblique and compressed; hilum oblong, linear, oblique.

This species in some respects resembles the smaller forms of C. Gronovii but is separable by the ordinarily tetramerous flowers and the depressed, capped capsule.

Type location:- "On the margins of ponds and swamps near St. Louis." Range:- Across the continent from Maine to Oregon and Washington and southward to Virginia, Tennessee and Texas.

Specimens examined:- Near 49th parallel of lat. (Lyall in 1858-59): Maine: Orono (Briggs 1509): Massachusetts: Framingham (Sturtevant in 1890): Connecticut: Waterbury (Dubois in 1888); Greens Farms (Polard 239): New Jersey: (Engelmann in 1879; Canby in 1862): Virginia: Little Falls of the Potomac (Mohr in 1894): New York: Cayuga Lake (Dudley in 1882; Wiegand in 1895); west New York swamps (VanSickle in 1894): Pennsylvania: Marysville (Small in 1888); Lancaster Co. (Porter in 1864); Easton (Porter in 1890 and in 1895);

Harrisburg (Porter in 1879): Tennessee: (Gattinger in 1886): Ohio: Port Clinton (Mosely in 1897); Erie Co. (Mosely in 1898); Painesville (Beardslee in 1876); Cincinnati (Lloyd in 1890): Michigan: Jackson (Camp in 1893); Algonac (Cooper in 1901): Indiana: Clarke (Umbach in 1898); Dune Park (Chase 1982); Wells Co. (Deam in 1905): Illinois: Wabash Co. (Schneck in 1880); Winfield (Moffatt 525); Peoria (McDonald in 1885 and in 1894; Brendel); Ravinia (Sherff in 1911); Vermillion Co. (McDougall in 1917); Oquawka (Patterson) Henderson Co. (Patterson 10430 and in 1872); Carlinville (Andrews in 1890); Libertyville (Sherff 1896); Athens (Hall in 1861 and in 1867); Taylorville (Andrews in 1898); Sangamon Co. (Andrews in 1898); Beardstown (Geyer); Ringwood (Vasey in 1861); Urbana (Pease; Yuncker 999a; 999b; Clinton 11794; 11795; 11796; 28574; 30449; 30450): Wisconsin: Osceola (Sheldard in 1892); Brown Co. (Schuette in 1894); Winnebago Co.(Kellerman in 1871); Racine (Davis in 1879); Prairie du Chien (Hall in 1861); Madison (Hall in 1861): Minnessota: Winona (Holzinger in 1889); Yellow Medicine Co. (Jacobs in 1888); Glyndon (Dewart in 1892): Iowa: Fayette Co. (Fink 207; 632); Ames (Hitchcock in 1894); Vinton (Davis in 1876): Missouri: St. Louis (Engelmann in 1841, taken as the type, in the Engelmann herb; also in 1842 and in 1860); Clark Co. (Bush in 1892); Jackson Co. (Bush 262): Kansas: Lawrence (Stevens): Nebraska: Lawsville (Williams in 1888); Sandbars of Niobrara (Clements 2808); Exeter (Wibbe in 1889 in part); Nickolls Co. (Hedgcock in 1894); Banks of the Missouri river (Hayden): Nevada: Humboldt Pass (Watson 937): Utah: Salt Lake City (Jones 1918; Garrett 2213); Ogden (Tracy in 1887): Oregon: Hood river (Henderson in 1884): Washington: Klickitat Co. (Suksdorf in 1883): California: Mt. Shasta (Grant 5217): New Mexico: (Wright

1626=578; 1629=124); Otero Co. (Wooton in 1899): Texas: Dallas (Reverchon in 1878).

37. Cuscuta racemosa chiliana Engelmann.

C. racemosa chiliana Engelmann, Trans. Acad. Sci. St. Louis 1:505. 1859.

No North American synonymy; for foreign synonymy see Engelmann, ibid.

Stems slender to medium. Flowers glabrous, about 3 mm. long, pentamerous, on pedicels as long as or mostly longer than the flowers in loose racemose cymes; calyx much shorter than the corolla tube; lobes short, deltoid, acute; corolla campanulate; lobes shorter than the tube, spreading to reflexed, triangular-ovate, acutish; scales scarcely reaching the filaments, fringed, bridged at about a quarter of their height; stamens about equalling the lobes; anthers oval-oblong, about equal to the somewhat subulate filaments; ovary globose; styles slender, rather longer than the ovary. Capsule globose, glandular, thin, not thickened but somewhat verrucose at the top; styles slightly tapering towards the base; seeds two to four in a capsule, about 1.5 mm. long, roundish, compressed, somewhat rostrate; hilum small, depressed.

Type locality:- Chile. Range in North America:- Scattered across the continent, mostly on Medicago sativa.

Specimens examined:- Maryland: near Baltimore (Hillman): S. Dakota: White River (Over 2355): Texas: Sanderson (Wooton in 1911): California: Kern Co. (Palmer 149); lower Sacramento (Jepson in 1893); Santa Cruz Mts. (Davis in 1908); northern California (Greene 1046).

38. Cuscuta decipiens n. sp.

Stems slender. Flowers about 3 mm. long, glabrous, pentamerous, subsessile or on pedicels as long as or slightly longer than the flowers; calyx lobes ovate, obtuse, somewhat shorter than the corolla tube; corolla campanulate, its lobes triangular-ovate, somewhat serrate, obtuse, or acute with an inflexed tip; scales as long as or shorter than the tube, deeply fringed, slightly spatulate, bridged at about a third of their height; stamens shorter than the lobes; filaments about equal to the oval anthers; ovary globose, slightly umbonate; styles slender, shorter than the ovary; stigmas capitate. Capsule globose-oval, slightly umbonate, with the withered corolla about it; seeds usually one or two in a capsule, about 1.7 mm. long, light brown or yellow, rostrate of hooked; hilum linear, oblong, oblique or transverse, the umbilical area scarcely contrasted with the rest of the seed.

All parts of the flowers are white or reddish and covered with numerous whitish pellucid glandular-appearing cells. This species resembles C. indecora, but is distinguishable by its obtuse calyx lobes, less fleshy and smooth flowers, with scales which are ordinarily shorter, as well as by the capsule which is not so much thickened at the apex.

Type locality:- Mexico, "Zacatecas, Hacienda de Cedros." Range:- Central Mexico.

Specimens examined:- Mexico: Zacatecas, Hacienda de Cedros (Lloyd 193, the type, in the U.S. Nat. Herb. as sheet 574,180), Hilo de Oro (Lloyd 28), Cedros (Kirkwood 50); Coahuila (Purpus 4873).

39. Cuscuta Coryli Engelmann.

C. Coryli Engelmann, Amer. Journ. Sci. & Arts 43:337. pl.6. f.7-11. 1842.--Matthew, Bull. Torr. Bot. Club 20. pl.164. f.5. 1893.-

Britton & Brown, Illustr. Flora 3:29. f.2961. 1898; 2 ed. 3:50. f.3447. 1913.

C. compacta crenulata Choisy in DC., Prodromus 9:459. 1845.

C. inflexa Engelmann, Trans. Acad. Sci. St. Louis 1:502. 1859.

C. congesta Beyrich; C. parviflora Nuttall; C. umbrosa Beyrich, herb. names without descriptions in Engelmann, Trans. Acad. Sci. St. Louis 1:502. 1859. in synon.

Epithymum Coryli (Engelmann) Nieuwland & Lunell, Amer. Mid. Nat. 4:511. 1916.

Stems medium to slender. Flowers fleshy, papillate, about 2 mm. long, mostly tetramerous (less frequently penta- or trimerous), on pedicels shorter or longer than the flowers, in panicled cymes; calyx lobes triangular, acute, equalling the corolla tube; corolla cylindric-campanulate; lobes triangular-ovate, crenulate, upright, with acute inflexed tips; scales rudimentary, bifid, toothed, ordinarily reduced to toothed wings on either side of the filament attachment, bridged somewhat below the middle; stamens about as long as the lobes; anthers oval to slightly oblong, on somewhat subulate filaments; ovary globose-ovoid, thickened at the apex; styles shorter than or equal to the ovary, becoming widely divergent on the capsule. Capsule at first globose, becoming depressed, thickening in a collar about the intrastylar aperture, the withered corolla about the upper part or soon falling away; seeds about 1.5 mm. long, usually four in each capsule, dark brown, globular or somewhat compressed, rather oblique, the surface scurfy; hilum short, oblong, oblique or transverse.

This species resembles C. indecora but differs in its ordinarily tetramerous flowers, rudimentary scales, more compressed

capsule and more widely divergent styles.

Type locality:- In dry prairies near St. Louis. Range:- From Rhode Island and Virginia westward to South Dakota, Nebraska and Montana and southward to Texas and Arizona.

Specimens examined:- Left bank of Missouri (Ward in 1883): Bluffs of the Cumberland (Ward in 1877): (Nuttall in herb. Acad. Phil., type of C. parviflora, a fragment in the Engelmann herb.): Rhode Island: Smithfield (Olney in 1872): Delaware: Harrington (Canby in 1886): Virginia: (Gray & Sullivant in 1843); Peak of Otter (Beyrich, the type of C. congesta, a fragment in the Engelmann herb.): Maryland: Piney Point (Vasey in 1873); Glen Echo (Hillman in 1904 and in 1905): New York: Washington Co. (Burnham in 1895); Ithaca (Dudley in 1882); Peekskill (Leggett in 1870); Niagara Co. (Clinton in 1864): Tennessee: Nashville (Ward in 1877); (Beyrich 175-2, the type of C. umbrosa, a fragment in the Engelmann herb.): Indiana: Blackford Co. (Deam 190); Wilsons (Hill 100-1897); Lake Co. Miller's (Hill 124-1897; 95-1876); Dune Park (Chase 522): Michigan: Port Huron (Dodge 104; 372; 4 collections without number in 1896); Detroit (Farwell 1291); Cass Co. (Pepoon 190): Illinois: Without location (Chase); Evanston (Johnson in 1888); St. Clair Co. (Eggert in 1897; Brendel in 1880); Chicago (Scammon 1; Hill 120-1897); Wabash Co. (Schneck in 1880 and in 1881); west of Chicago (Chase in 1894); Cook Co. (Chase in 1896); Joliet (Skeels & Shaddick in 1900); Riverside (Greenman 2782); Glencoe (Sherff in 1911); Athens (Hall 4); Highland (Meyer in 1841); Beardstown (Geyer in 1842); Mascoutah (Welch); Peoria (Brendel); Carlinville (Andrews in 1890): Wisconsin (Hale in 1860-61): Minnesota: Fergus Falls (Sheldon in 1892); Cannon Falls (Pol in 1888): S. Dakota: Brook-

ings (Williams in 1896); Jones Island, Big Stone Lake (Griffiths & Slosser in 1894): Nebraska: (Clements 2808); Bottoms of Yellowstone river (Hayden 26 in 1853-54); Thomas Co. (Rydberg, two collections with number 1688, one collected August 26 and the other August 14, 1893); Holt Co. (Clements 2799); Ashland (Williams in 1889); Long Pine (Bates in 1896): Missouri: St. Louis Co. (Engelmann in 1860; 1842; 1843; August 1841 and Sept. 1841, taken as the type, in the Engelmann herb; Eggert in 1879; Craig in 1908; Greenman 3800; Garber in 1911; Drushell in 1916); Barry Co. (Bush 327; 3244; 202 and without number in 1892); MacDonald Co. (Bush 28); Baring (Bush 6); Polk Co. (Standley 9937); Courtney (Bush 1815; 411); Sarcoxie (Palmer 3197); Meramec (Pammel); Stone Co. (Trelease 1113); Seligman (Dewart in 1892); Anderson (Bush in 1892); Joplin (Palmer 3835): Iowa: Decatur Co. (Fitzpatrick 25): Indian Territory: Limestone Gap (Butler 19; 50; 94 and 11236?): New Mexico: (Fendler 658): Arizona: Grand Canyon (Eggert in 1886): Texas: Williamson Co. (Bodin 230); Calvert (Pammel in 1888); Fort Smith (Ark.) to the Rio Grande (Bigelow 8): Montana: Poplar (Blankinship in 1900).

40. Cuscuta indecora Choisy.

C. indecora Choisy, Mém. Soc. Phys. et Hist. Nat. Genève 9:278. pl.3. f.3. 1841; and in DC., Prodromus 9:457. 1845.--Engelmann, Trans. Acad. Sci. St. Louis 1:503. 1859.--Matthew, Bull. Torr. Bot. Club 20. pl. 164. f.4. 1893.--Britton & Brown, Illustr. Flora 3:29. f.2960. 1898; 2 ed. 3:50. f.3446. 1913.

Epithymum indecorum (Choisy) Nieuwland & Lunell, Amer. Mid. Nat. 4:511. 1916.

Stems medium to coarse. Flowers 2.5-4 mm. long, whitish, fleshy, papillose to smoothish, on pedicels shorter or longer than the flowers, stigmas and anthers commonly purplish colored; calyx

lobes triangular to lanceolate, acute; corolla campanulate; lobes erect to spreading, triangular, acute, the tips inflexed; scales as long as or longer than the tube, ovate or somewhat spatulate or divided, deeply fringed, bridged at or below the middle; stamens shorter than the lobes; anthers broad, oval, about equal to the filaments; styles as long as or slightly longer than the globose, pointed ovary, unequal, becoming divaricate in fruit. Capsule globose, pointed, enveloped by the withered corolla; seeds about 1.7 mm. long, usually two to four in a capsule, roundish or broader than long, grayish or brown, somewhat scurfy; hilum small, oval, transverse or somewhat oblique.

Key to the varieties.

Scales not divided, ovate or spatulate.
    Calyx lobes broad, ovate, acute.
        Flowers about 2-3 mm. long, papillose-hispid - - hispidula.
        Flowers usually larger, not so papillose-hispid - - neuropetala.
    Calyx lobes lanceolate, acute - - - - - - - - - - longisepala.
Scales divided at the apex - - - - - - - - - - - - - - - - - bifida.

Cuscuta indecora hispidula (Engelmann) n. comb.

C. indecora Choisy, Mém. Soc. Phys. et Hist. Nat. Genève 9:278. pl. 3. f.3. 1841.

C. verrucosa hispidula Engelmann, Amer. Journ. Sci. & Arts 43:341. 1842.

C. hispidula Engelmann, Amer. Journ. Sci. & Arts 45:75. 1843.

C. neuropetala minor Engelmann, Bost. Journ. Nat. Hist. 5:223. 1847.

C. porphyrostigma Engelmann, ibid. in synon.

C. decora indecora Engelmann, Trans. Acad. Sci. St. Louis 1:502. 1859.

Flowers 2-2.5 mm. long, usually on pedicels longer than the flowers; calyx mostly shorter than the corolla, more papillose-hispid than in the other varieties.

Type locality:- "Mexicum ad Metamoros". Range:- Texas, New Mexico and Indian Territory and in the Greater Antilles.

Specimens examined:- (Berlandier 2285, the type number, in the Engelmann herb. from Mexico?): Texas: (Berlandier 865; 965; Lindheimer 123; Neally 141); eastern part of the state (Hall 491); Llano Co. (Neally 83); Llano (Smith in 1897); New Braunfels (Lindheimer 318; 1029); San Antonio (Wilkinson in 1902); Fort Worth (Ruth 188); Columbia (Bush 1535); Dallas (Hall 493 in part): New Mexico: Fort Whipple (Coues & Palmer 246): Oklahoma: Greer Co. (Stevens 1000): Indian Territory (Sheldon 134): West Indies: Cuba, Camaguey (Shafer 2635): Jamaica, Port Antonio (Fredholm 3304).

Cuscuta indecora neuropetala (Choisy) Hitchcock.

C. indecora neuropetala Hitchcock, Contrib. U.S. Nat. Herb. 3:549. 1896.

C. neuropetala Engelmann, Amer. Journ. Sci. & Arts 45:75. 1843.

C. neuropetala littoralis Engelmann, Bost. Journ. Nat. Hist. 5:223. 1847.

C. pulcherrima Scheele, Linnaea 21:750. 1848.

C. decora pulcherrima Engelmann, Trans. Acad. Sci. St. Louis 1:502. 1859.

?C. indecora portoricensis Urban, Symb. Ant. 4:502. 1910.

Flowers usually larger than in the other varieties, loose or compacted; corolla broadly campanulate, varying in its degree of papillation. Forms from the southeastern United States frequently are more waxy white than those from the west. The calyx lobes are shorter than or equalling the corolla.

Type locality:- "Texas in wet prairies near Houston." Range:- From Illinois to California and Utah to Mexico and to the West Indies.

Specimens examined:- American plains (Hall & Harbour 464): Illinois: (Engelmann in 1845); St. Clair Co. E. Carondolet (Eggert in 1877): Minnessota: Fergus Falls (Sheldon in 1892): S. Dakota: Washington Co. (Over 2157): Nebraska: Merrinem (Bates in 1896); Hooker Co., Mullen (Rydberg 1634; 1694); Waho (Rydberg); Banner Co. (Rydberg in 1890); Cheyenne Co. (Rydberg 3700): Kansas: Syracuse (Rose 17027; Thompson 159): Louisiana (Langlois in 1879); Brush Island (Tracy 128): Alabama: Mobile (Mohr in 1888, and in 1876; 885c): Florida: Santa Rosa Island (Tracy 6432); Wakulla Co., St. Marks (Harper 209); Colquitt Co. (Harper 1650); Palma Sola Bay (Simpson 68); Tallahassee (Harper 224); Manatee (Simpson in 1889): Colorado: (Herb. State. Agr. College 1541); Colorado Springs (Porter in 1873; Cooper 421); Evans (Johnson 399); Denver (Eastwood in 1890; 129); Fot Collins (Baker 555); Boulder (Daniels 426): Texas: (Lindheimer 124, taken to represent the type, in the Engelmann herb; 474; III 475); San Antonio (Neally 94; Headly in 1907; Ball 919); Del Rio (Plant in 1891); Val Verde Co., Comstock (Neally 126); Bexar Co. (Jermy 74; 75): Arizona: Globe (Goodding 724); Fort Lowell (Thornber 133); Pine (McDougall 685); Tucson (Thornber 32; 87; Smart 345; Rose 11887; Toumey 96); Rincon Mts. (Toumey in 1894); Santa Catalina Mts. (Pringle in 1881; Lemmon in 1881); Castle Creek (Toumey 293); Monmouth (Neally 278): New Mexico: (Wright 521; 1622; 1633; 525; 1638; 1630; 1634; 1632); Nara Visa (Fisher 147): Utah: Salt Lake City (Garrett 192; 1714; 1719; Jones 1331; in 1880): Wyoming: Laramie Co., Uva (Nelson 2741, in part; 8576); Sheridan Exp. Farm (Buffum 1405): Idaho: Moscow Exp. Station (Henderson

2892): California: (Leiberg 5396); San Bernardino Co. (Parish 5532; 5905); Butte Co. (Brown 132; Heller 11677); Lake Co. (Bolander 2673); Humboldt Co. (Chesnut & Drew in 1888); Clear Lake (without indication of collector); Clovis (Brandegee); Fresno (Brandegee); Yolo Bolo Mt. (Brandegee in 1892); Shasta River, northern Calif. (Greene 978): West Indies: Cuba (Wright 3649), Santa Clara (Britton, Britton & Wilson 5507): Santa Domingo, Barahona Province (Fuertes 117; 916; 975b): Jamaica: Port Antonio (Wight 73): Mexico: State of Sonora (Rose, Standley & Russell 12477); State of Coahuila (Purpus 4563), Parras (Purpus 6343); State of Zacatecas (Palmer 284); San Dieguito (Palmer 630); Tamaulipas, Tampico (Palmer 530).

Cuscuta indecora longisepala n. var.

Flowers subsessile, compacted; calyx lobes lanceolate, acuminate, as long as or exceeding the corolla. Some specimens approach variety neuropetala in their shorter calyx lobes.

Type locality:- On the Blanco, Texas. Range:- Indian Territory, Texas and northern Mexico.

Specimens examined:- Texas: on the Blanco (Wright, the type, in the Engelmann herb.); Dallas (Reverchon in 1875; Hall 493, in part): Indian Territory: (Butler 2); Limestone Gap (Butler in 1877): Mexico: (Palmer 333); San Luis Potosi, San Dieguito (Palmer 640).

Cuscuta indecora bifida n. var.

Calyx lobes shorter than the very white corolla; scales rather deeply divided at the apex.

Type locality:- Twin Springs, Nevada.

Specimens examined: Nevada: Twin Springs (Purpus, the type, in the Univ. Calif. herb.).

41. Cuscuta californica Choisy.

C. californica Choisy, Mém. Soc. Phys. et Hist. Nat. Genève 9:279.

1841; and in DC., Prodromus 9:457. 1845.--Engelmann, Trans. Acad. Sci. St. Louis. 1:498. 1859.

C. acuminata Nuttall in Engelmann, ibid. 498. 1859. nomen nudum, in synon.

Stems slender. Flowers 2-5 mm. long, glabrous or papillate, subsessile in compact clusters or on slender pedicels in loose panicled cymes; calyx as long as the corolla tube or shorter; lobes lanceolate, acute to acuminate, or shorter, ovate and somewhat obtuse, their tips frequently somewhat divergent; corolla campanulate or cylindrical; lobes ovate to lanceolate, acute or somewhat obtuse, as long as or longer than the tube, connivent to spreading or reflexed; scales rudimentary, represented only by short bridges or "inverted arches"; atamens shorter than the lobes; filaments about equal to or slightly longer than the oval to linear anthers; styles as long as or longer than the somewhat ovate or conic ovary. Capsule globose or ovoid-conic, enveloped by the withered corolla; seeds about 1 mm. long, oval, slightly compressed, rather rostrate, one to four in each capsule; hilum oblong, transverse or oblique.

This is the only species found so far in this country with the scales represented only by the shallow bridges.

Key to the varieties.

Capsule globose, not pointed.
    Flowers glabrous.
        Calyx lobes acute to acuminate, usually reaching at least the middle of the corolla tube.
            Flowers more or less pedicelled; styles as long as or longer than the ovary - - - - - graciliflora.
            Flowers subsessile; styles shorter than the ovary - - breviflora.

Calyx lobes rather obtuse, not reaching the middle of the corolla tube - - - - - - - - - - - - - - - - brachycalyx.

Flowers papillose - papillosa.

Capsule ovoid-conic - apiculata.

Cuscuta californica graciliflora Engelmann.

C. californica graciliflora Engelmann, Trans. Acad. Sci. St. Louis 1:499. 1859.

C. californica longiloba Engelmann, ibid.

Flowers rather variable in size, somewhat pedicelled; calyx lobes ovate; corolla cylindrical to campanulate; lobes connivent to reflexed; anthers elliptical to oblong; styles as long as or longer than the ovary.

I have been unable to keep apart the two varieties indicated by Engelmann. The specimens included here are usually called variety longiloba in collections.

Type locality:- "Nov. Californiam." Range:- Pacific coast states, and inland to Nevada and Utah and to Lower California.

Specimens examined:- California: (Orcutt in 1888; Collins & Kempton 315; Leiberg 5267); San Benito Island (Anthony 266); Amador (Michener & Bioletti in 1893); San Felipe (Thurber 633); San Diego Co. (Anderson in 1894), San Diego (Thurber 570; Wooton in 1903; Parry in 1850; Orcutt 1499); Surf (Brandegee); Santa Clara Co. (Brewer 1283); Pacheco's Pass (Brewer 1292); Claremont (Chandler in 1897); Escondido (Chandler 5384); Los Angeles Co. (Abrams 1560; 2654), Los Angeles (Tracy in 1888), Azuza (Baker 1560), Brush Canyon near Cahuenga Peak (Chandler 2010); Riverside (Hall in 1897; Brandegee in 1905); Yosemite National Park (Hall 9219); Ramona (Brandegee in 1905); Badger (Brandegee in 1892); Sierra Nevada Mts. (Lemmon in 1875); San Bernardino Co. (McGregor & Abrams 700), San Bernardino (Coville &

Funston 102); Mendocino Co. (McMurphy 55); Ventura Co. (McGregor & Abrams 36); Cleveland National Forest (Hitchcock in 1915); Julian (Hitchcock); San Francisco Co. (Michener & Bioletti in 1891); San Clemente Island (Trask 187); Take Tahoe (Leiberg 5330); Coloma (Palmer 2392d); Tulare (Palmer 2761); Death Valley (Coville & Funston 338); Monsovia (Rusby in 1909): The following four specimens are somewhat larger than normal: Black Rock Mts. (Leiberg 5266, labelled C. Newberryi); San Antonio Mts. (Hall); Kern Co. (Burtt-Davy 1941): Lower California: El Rancho Viego (Brandegee 7); San Fernando (Brandegee in 1889): Washington: Spokane (Turesson in 1913): Nevada: Las Vegas (Goodding 2296): Utah: Bingham (Jones 1875).

Cuscuta californica breviflora Engelmann.

C. californica breviflora Engelmann, Trans. Acad. Sci. St. Louis 1:499. 1859.

Flowers subsessile in dense glomerules; corolla somewhat narrowly campanulate; stamens and styles short; anthers oval. The flowers as the capsule matures, when viewed from above, present a rather characteristic stellate appearance because of the spreading of the lobes.

Type locality:- Monterey, California. Range:- Pacific coast states, and inland to western Colorado.

Specimens examined:- Oregon: La Grande (Cusick 2347); Grant's Pass (Howell 1884); Cougar Peak (Coville & Leiberg 175): Washington: Peshastin (Sandberg & Leiberg 495); Blue Mts., southeastern part of the state (Horner 373): Californica: San Francisco (Gardner in 1901); Monterey Co. (Chandler 423); San Benito Island (Brandegee in 1897); Siskiyou (Butler 15);Santa Catalina Island (Brandegee in 1890); Humboldt Co. (Tracy 4760); Mt. Silliman (Brandegee in 1905); Yose-

mite Valley (Hall 9094); Contra Costa Co. (Elmer 4543); Tuolumne Valley (Bolander 5055); Clear Lake (Torrey 325): Nevada: Rhyolite (Heller 9684): Utah: Bingham (Jones 1875); Jordan Valley (Watson 938); City Creek Canyon (Jones 1915); Salt Lake Co. (Garrett 2170): Colorado: Paonia (Osterhout 4602): Mexico: Lower California, San Bartolomé Bay (Rose 16206).

Cuscuta californica brachycalyx n. var.

Flowers in dense cymose clusters; calyx very short; lobes broadly ovate, obtuse to acutish; corolla campanulate; lobes reflexed, shorter than the tube, triangular, acutish.

Type locality:- Near Hanford, California. Range:- Found so far only in California.

Specimens examined:- California: Near Hanford (Kearney 52, the type, in the N.Y. Bot. Gard. herb.); Fresno (Sones 79); Yosemite Valley, Stoneman Bridge (Reed in 1911); Dugan (Brandegee in 1914); Vacaville (Jepson in 1891); Snow Mt. (Brandegee); Tulare Co. (Michener & Bioletti in 1893), Goshen (Congdon 66), Tulare (Congdon 65).

Cuscuta californica papillosa n. var.

Flowers in loose or compact clusters, papillose pubescent.

Type locality:- San Bernardino Valley, California. Range:- Found so far only in California.

Specimens examined:- California: San Bernardino Valley (Parish 5524, the type, in the Rocky Mt. Herb. in Univ. Wyo.); San Jacinto Mts. (Hasse in 1892; Hall in 1901); Riverside Co. (Parish 4130), Riverside (Reed 2372); Monterey Co. (Vasey 437); San Diego Co. (Parish 538a); Lake Co., Elk Mt. (Tracy 2349).

Cuscuta californica apiculata Engelmann.

C. californica apiculata Engelmann, Trans. Acad. Sci. St. Louis 1:499. 1859.

Corolla somewhat granulate, particularly towards the base, campanulate; ovary and capsule ovoid, pointed.

Only one specimen, the type, was seen. The pointed capsule is definite and warrants the segregation of the plant as a variety.

Type locality:- California, "On the Colorado."

Specimens examined:- California, On the Colorado (Bigelow in 1854, the type, in the Engelmann herb.).

42. Cuscuta Harperi Small.

C. Harperi Small, Flora of the Southeastern United States, 2 ed. 1361. 1913.

Stems very slender. Flowers penta-, tetra- or trimerous, about 1 mm. long, on pedicels mostly as long as or longer than the flowers in loose racemose clusters; calyx shallow, the lobes short, broadly ovate, obtuse, frequently slightly keeled and tuberculate; corolla campanulate; lobes triangular-ovate, acute, about equalling the tube, upright, slightly fleshy, with their tips inflexed, in fruit upright or reflexed; scales narrow, fringed with a few short processes particularly about the upper half, as long as or somewhat longer than the corolla tube, bridged at about one-third their height; stamens shorter than the lobes, filaments slightly tapering and equal to the small, oval anthers; ovary globose-oval, with a slightly thickened collar about the intrastylar aperture; styles slender, shorter than the ovary; stigmas capitate. Capsule oval, with the withered corolla at its base; seeds about 1-1.2 mm. long, ordinarily but one in a capsule, yellow brown, somewhat spherical; hilum a fine line, transverse or oblique, the umbilical area somewhat sunken.

This species seems to be rather rare. It closely resembles some of the smaller specimens of C. pentagona microcalyx, from which

it differs in the shape of its scales, calyx and capsule.

Type locality: Alabama, Etowah Co. Range:- Northern Alabama.

Specimens examined:- Alabama: Etowah Co. (Harper 147, taken as the type, in the N.Y. Bot. Gard. herb; Pollard & Maxon 341); De Soto Falls (Ruth 493; and in 1893).

43. Cuscuta rostrata Shuttleworth.

C. rostrata Shuttleworth in Engelmann, Bost. Journ. Nat. Hist. 5:225. 1847.--Engelmann, Trans. Acad. Sci. St. Louis 1:508.1859.--Matthew, Bull. Torr. Bot. Club 20. pl. 165. f.10. 1893.--Britton & Brown, Illustr. Flora 3:30. f.2964. 1898; 2 ed. 3:51. f.3450. 1913.

C. oxycarpa Engelmann, Bost. Journ. Nat. Hist. 5:225. 1847. in synon.

Stems coarse. Flowers glabrous, 4-6 mm. long, pentamerous, on pedicels shorter than the flowers in compact paniculate cymes; calyx shorter than the campanulate corolla; lobes ovate, obtuse, overlapping; corolla membranaceous, cells very evident, somewhat thickened lines running lengthwise below the stamen insertions giving the corolla a rather angled appearance; lobes shorter than the tube, broad, ovate, obtuse, erect, becoming spreading and later reflexed in fruit; scales shorter than the tube, oblong, deeply fringed with long processes, shorter processes frequently evident on the bridge which is about a third of their height; stamens shorter than or about as long as the lobes; anthers oval, shorter than the subulate filaments; ovary flask-shaped with a long somewhat two-beaked neck; styles shorter than the ovary. Capsule globose, flask-shaped, beaked, enveloped by the withered corolla; seeds light brown, about 2.4 mm. long, varying from one to four in each capsule, slightly rostrate, obovate or oblong, oblique; hilum oblique or transverse, the umbilical area slightly striated.

Type locality:- Little Craggy Mountains, N. Carolina. Range:- In the Alleghany Mountains from Virginia to South Carolina.

Specimens examined:- W. Virginia: (Gray & Sullivant in 1853); White Sulphur Springs (Steele in 1906): N. Carolina: (Rugel, without number or date, perhaps the same as the type collection; Curtis in 1845; Canby in 1880; Ashe); Waynesville (Stanley 5372; Canby in 1876); Balsam Mts. (Ball in 1890; Canby in 1876); Mt. Mitchell (Biltmore Herb. 5727); Transylvania Co. (Biltmore Herb. 5727a); Buncombe Co. (Biltmore Herb. 5727b); Roan Mt. (Canby in 1884; Chickering in 1877 and in 1880; Cannon 172; Ashe); Biltmore (Mohr in 1899); Little Craggy Mts. (Rugel in 1841, the type, in the Engelmann herb.); Grandfather Mt. to Linville (Hitchcock in 1905); Swain Co. (Beardsley & Kofoid in 1891): S. Carolina: (Buckley in 1842): Tennessee: Cocke Co. (Kearney 842); Gattingsberg (Canby in 1888).

44. Cuscuta Gronovii Willdenow.

C. Gronovii Willdenow in Roemer & Schultes Syst. 6:205. 1820.--Choisy Mém. Soc. Phys. et Hist. Nat. Genève 9:281. pl. 4. f.3. 1841; and in DC., Prodromus 9:459. 1845.--Engelmann, Trans. Acad. Sci. St. Louis 1:507. 1859.--Matthew, Bull. Torr. Bot. Club 20. pl. 165. f.9. 1893.--Britton & Brown, Illustr. Flora 3:30. f.2963. 1898; 2 ed. 3:51. f.3449. 1913.

Epithymum Gronovii (Willdenow) Nieuwland & Lunell, Amer. Mid. Nat. 4:511. 1916.

Stems medium to coarse. Flowers glabrous, about 2-4 mm. long, pentamerous, on pedicels as long as or longer than the flowers, in loose or dense panicled cymes; calyx lobes broad, ovate, orbicular or oblong, obtuse, overlapping, shorter than or equalling the corolla tube, sometimes somewhat serrated; corolla campanulate, its lobes as long as or shorter than the tube, obtuse,

spreading; scales variable, shorter than the tube or equalling it, ovate or oblong, infrequently more or less truncated or divided, deeply fringed with longer processes towards the apex and shorter ones towards the base and frequently on the bridge which is below the middle; stamens nearly as long as the lobes; filaments longer than the oval anthers; styles shorter than the globose, conical ovary. Capsule globose-conic, umbonate, enveloped by the corolla or infrequently bearing this about its apex; seeds about 1.5 mm. long, two to four in a capsule, compressed, obliquely ovate, slightly rostrate, brown; hilum linear, oblique or transverse.

Cuscuta Gronovii latiflora Engelmann.

C. Gronovii latiflora Engelmann, Trans. Acad. Sci. St. Louis 1:508. 1859.

C. Saururi Engelmann, Amer. Journ. Sci. & Arts 43:339. pl. 6. f.17-21. 1842.

Calyx lobes nearly as long as or equalling the shallowly campanulate corolla, the lobes of which equal the tube.

Type location:- "In the 'American Bottom' opposite St. Louis." Range:- Pennsylvania, westward to Missouri and southward to Texas.

Specimens examined:- Pennsylvania: Harrisburg (Porter in 1879); York Co. (without indication of collector): Illinois: Opposite St. Louis (Geyer in 1841, taken as the type, in the Engelmann herb; Engelmann in 1843; Eggert in 1877): Missouri: (Short in 1843); St. Louis (Engelmann in 1841; in 1845; Riehl in 1843); Butler Co. (Russell); Clay Co. (Mackenzie 370); Webb City (Palmer 2737); Jasper Co. (Palmer 1292): Indian Territory: Cherokee Nation (Blankinship in 1895): Texas: Dallas (Reverchon).

Cuscuta Gronovii vulgivaga Engelmann.

C. Gronovii vulgivaga Engelmann, Trans. Acad. Sci. St. Louis 1:508.

1859.

C. vulgivaga Engelmann, Amer. Journ. Sci. & Arts 43:338. pl. 6. f. 12-16. 1842.

C. americana of various authors, according to Engelmann, Trans. Acad. Sci. St. Louis 1:508. 1859. in synon.

C. polyantha Shuttleworth in Engelmann, ibid. in synon.

C. umbrosa Beyrich in Engelmann, ibid. in synon.

Corolla deeper, less openly campanulate than in var. latiflora, its lobes ordinarly shorter than the tube; calyx lobes usually not reaching the sinuses. The commonest of the varieties.

C. vulgivaga of Engelmann when published was made to consist of three nominal varieties though he did not keep up this segregation later. These were variety laxiflora which may have been considered the most representative of the species which included most of the material from the interior of the country, and the type of which seems to have been a specimen collected in New York state by Dr. Gray; variety glomerata from Vermont, collected by Carey and variety tetramera from Connecticut, collected by Carey.

Type locality:- "Western New York." Range:- From Canada to Florida and westward to Nebraska, Arizona and Texas.

Specimens examined:- Maine: (Ricker 469); Aroostook Co. (Fernald 88); Veazie (Knight in 1905); Maxfield (Ricker 1396; 1397); Auburn (Merrill 699); Machiasport (Barber in 1898); Leeds (Sturtevant in 1862); Orono (Harvey & Harvey 699 and in 1895); Cape Elizabeth (Gayle 811): Massachusetts: Belmont (Pound in 1889); Andover (Foster in 1901); Littleton (Harwood in 1901); Williamstown (without name of collector; Day 64); So. Hadley (Cook in 1887); Northampton Stevens in 1895); Morrison (Morris in 1897); Cambridge (Engelmann

in 1856); Nonquit (Sturtevant in 1888); Lincoln (Greenman 2138); Amherst (Woolson 17194); Hampden Co. (Seymour 20); Riverside (Greenman 1478): Rhode Island: Cumberland (Greenman 1825): Connecticut: Cromwell (Brandegee in 1869); Bridgeport (Eames in 1894): New Hampshire: (Carey): Vermont: Brandon (Knowlton in 1895): Maryland: Chesapeake Bay (Shull 112; 189; 289; 368); Elkton (Shreve 381); Cabin John (Chase 2626): District of Columbia: Washington (Steele in 1912; Tweedy in 1890; Oldberg in 1872; Ward in 1876; Hitchcock in 1904): West Virginia: Greenbriar Co. (Steele in 1906); Aurora (Steele in 1898); Jefferson Co. (Palmer 22); Upshur Co., Bucklin (Pollock): Virginia: Luray (Steele 93): New Jersey: Passaic Co. (Mackenzie 3797): N. Carolina: (Chalmot; Curtis in 1845; Buckley 1844); Plymouth (Hemmick 4); Polk Co. (Townsend in 1897); Stanley Co., Falls of Yadkin River (Small in 1894); Ashville (Gray & Sullivant in 1843); Hillsborough (Curtis): S. Carolina: Oconee Co. (Anderson 1385); Big Stone (Williams in 1892): Florida: Lee Co. (Hitchcock 232); Ft. Meyer (Simpson 380): Alabama (Buckley in 1841; Shuttleworth in 1843); Mobile (Mohr in 1873; in 1882; in 1893 and in 1896); Marshall Co. (Milligan in 1907); Franklin Co. (Prout in 1840): Georgia: (Carey); Rome (Without name of collector, in 1891): Louisiana: New Orleans (Cocks); Natchitoches (Palmer 8710): Tennessee: Nashville (Gattinger in 1886)?; Knoxville (Bain in 1894); Chattanoga (Engelmann in 1876); Hiawassee Valley (Ruth 8); Jackson (Bain 338): Kentucky: (Short in 1840); Bell Co. (Kearney 472; 588): New York: Oneida Co. (Maxon in 1897); West Chester Co. (Pollard in 1894); Oxford (Coville in 1895); Dutchess Co. (Standley & Bullman 12271); New Lebanon (Harrison in 1888); Round Lake (McCall in 1877); Coeman Hollow (Shear in 1891); Fort Ann (Burnham 37); LeRoy (Hill 151-1871);

Honeoye Lake (Hill 81-1884); Buffalo (Clinton in 1864); Tarrytown (Schrenk in 1892); Oswego Co., South Scriba (Rowlee in 1906): Pennsylvania: Meadville (Clinton); Buck Co. (Mayer in 1867); Penn Yan (Bartwell); Millersville (Small in 1890); York Co. (Heller & Halbach 1357); Sellersville (Fretz in 1882); Reading (Bischoff in 1848); Lower Merron (Redfield 5853); Fairmont Park (Redfield 5854); Chester Co. (Canby 3); Bethlehem (Moser 1832); Montgomery Co. (Brinton in 1888); Philadelphia (Greenman 1477); Pocono Plateau (Harshberger in 1904): Ohio: Oxford (Fink 305); Berea (Ashcraft in 1895); Albion (Ashcraft in 1895); Granville (Jones 1370); Elyria (Dick in 1890 and in 1895); Painesville (Beardslee in 1876): Michigan: Flint (Clark 4264); Lansing (without name of collector, in 1885); Cass Co. (Pepoon 190; 191; 450); Greenville (Barlow in 1900); Macomb Co. (Cooley in 1882); Alma (Davis in 1889 and in 1892); Van Buren Co. (Pepoon 837; 892); Berrien Co. (Lansing 3301); Haslett (Yuncker 742); Portland (Yuncker 695): Indiana: Steuben Co. (Deam in 1906); Indianapolis (Yuncker in 1916); Muncie (Brady in 1896); Notre Dame (Nieuwland 11500); Olio (Wilson in 1897): Illinois: St. Clair Co. (Eggert in 1891); Chicago (Moffatt 1650=525), Gardner's Park (Chase 600), South Chicago (Hill 134-1882); Mt. Carmel (Schneck); Palmyra (Schneck); Stark Co. (Chase 169; and in 1896); Elgin (Sherff 1813; 1979); Peoria Co. (Chase 1181), Peoria (McDonald in 1886 and in 1887); DuPage Co. (Moffatt 525); Beardstown (Geyer in 1842); Bluff Lake (Pammel in 1886); Athens (Hall in 1860); Joliet (Greenman 2695): Wisconsin: Milwaukee (Lapham in 1842; Hasse in 1882); Madison (without indication of collector, in 1893); Fulton (Hall 2): Minnesota: Little Lake (Taylor in 1892); Aiken Co. (Sandberg 841); Wabasha Co. (Scott in 1886); Clitherall (Campbell in 1897); Winona (Holzinger in 1888); Minneapolis (Sandberg in 1890): S. Dakota: (Duffey in 1889;

Griffiths & Slosser 38; 105): Missouri: (Bush in 1888); Butler Co. (Eggert in 1893); Monteer (Bush 215; 4909); Green Co. (Standley 9502), Turner (Standley 9848); Sibley (Bush 812); Fish Lake (Bush in 1888); Dunklin Co. (Bush 10); Polk Co. (Standley 9902); Jackson Co. (Bush 1011; 1067); Barry Co. (Trelease 1112); McDonald Co. (Palmer 4149); Meramec (Pammel in 1886); Bismark (Bush in 1893); Campbell (Bush in 1893); Jasper Co. (Palmer 2821; 808; 2737): Nebraska: Holt Co. (Clements 2799½); Lincoln (without indication of collector in 1889): Arizona: Grand Canyon (Eggert in 1886): Texas: Columbia (Bush 1568; 1569; 1509): Arkansas: Prescott (Hollister 120); Little Rock (without name of collector, in 1885); Baxter Co. (Palmer 4757); Marion Co. (Palmer 8407): Indian Territory: (Bush 387); Cherokee Nation (Blankinship in 1895); Sapulpa (Bush 1416): Canada: (Armstrong in 1892); Ontario, Kingston (Fowler in 1884 and in 1894); New Brunswick, Miramichi, Black River (Fowler in 1892); Fredricton (Fowler in 1880); Quebec, Longueuil (Brother Victorin 3147).

Cuscuta Gronovii calyptrata Engelmann.

C. Gronovii calyptrata Engelmann, Trans. Acad. Sci. St. Louis 1:508. 1859.

C. calyptrata (Engelmann) Small, Flora of the Southeastern United States 969. 1903.

C. bonariensis H.B. Carls. Engelmann, Trans. Acad. Sci. St. Louis 1:508. 1859. in synon.

Flowers deeper campanulate and relatively larger; corolla surrounding the apex of the capsule. The specimens of C. bonariensis in Engelmann's herbarium are definitely characterized by the corolla capping the capsule, but it is somewhat doubtful in my mind if the specimens of C. Gronovii exhibiting this character less definitely are the same.

Type locality:- Western Louisiana. Range:- Texas to Louisiana.

Specimens examined:- Louisiana: (Gregg, taken as the type, in the Engelmann herb.): Texas: Houston (Lindheimer in 1841; 235?).

45. Cuscuta curta (Engelmann) Rydberg.

C. curta (Engelmann) Rydberg, Bull. Torr. Bot. Club 40:466. 1913.

C. umbrosa Hooker, Fl. Bor.-Amer. 2:78. 1840. (in part) according to Engelmann, Trans. Acad. Sci. St. Louis 1:508. 1859.

C. Gronovii curta Engelmann, Trans. Acad. Sci. St. Louis 1:508. 1859.

C. megalocarpa Rydberg, Bull. Torr. Bot. Club 28:501. 1901.

Stems coarse. Flowers glabrous, about 2-3 mm. long, pentamerous, on short pedicels as long as or sometimes shorter than the flowers, in cymose panicles, the clusters becoming globular because of the growth and crowding of the capsules; calyx lobes ovate, obtuse, overlapping, their edges infrequently slightly serrulate and uneven, reaching about the middle of the corolla; corolla campanulate; lobes triangular, obtuse, spreading, ordinarily reflexed in fruit; scales shorter than the tube, rather variable, but mostly truncated or more or less divided and fringed with medium length processes, bridged at about the middle, stamens slightly shorter than or about as long as the corolla lobes; anthers oval, about equal to or shorter than the subulate filaments; ovary globose-conic, styles very short, about one-fourth the length of the ovary. Capsule globose-conic, somewhat umbonate or beaked, 4-6 mm. in diameter, with the withered corolla mostly about the upper part but sometimes at the base; intrastylar aperture rather large; styles usually convergent; seeds about 2-2.8 mm. long, slightly rostrate; hilum transverse or oblique.

This species is closely allied to C. Gronovii. It differs from it, however, in the possession of a much larger capsule, shorter styles, and usually bifid and truncated scales.

Type locality:- "Northwestern America". Range:- Minnesota to Wyoming and south to Colorado and New Mexico.

Specimens examined:- Southwest Kansas to New Mexico (Bell in 1867): Northwest America (Fremont's 3rd Exped. 79, the type, in the Engelmann herb.): Minnesota: Chatfield (Hall 3); Preston (Hill 66-1876; Leach in 1861): N. Dakota: Benson (Lunell in 1909); Walhalla (Waldron 1697); Valley City (Perrine in 1896); Ward Co. (Lunell in 1908); Dunseth (Lunell in 1907): S. Dakota: Black Hills (Peterson in 1909): Nebraska: Ashland (Williams 355): Colorado: Huerfano Co. (Greene in 1913); Canyon City (Brandegee 704); Platte Canyon, Dome Rock (Jones 571); La Veta (Vreeland 670, the type of C. megalocarpa, in the N.Y. Bot. Gard. herb.); Colorado Springs (Porter in 1873); Ute Pass (Porter in 1873); Manitou (without indication of collector, in 1885; Mulford in 1892): Wyoming: Horseshoe Park (Nelson 5053); Plumbaga Canyon (Schueburt in 1893): Utah: (Tracy in 1887); Salt Lake City (Jones in 1880); City Creek Canyon (Jones 1914; Leonard 250): Montana: Belt River (Williams 220): New Mexico: Lincoln Co. (Wooton & Standley 3488; 3959); Balsam Park (Ellis 221;224).

46. Cuscuta denticulata Engelmann.

C. denticulata Engelmann, Amer. Nat. 9:348. 1875.--Hillman, Nev. Agr. Exp. Sta. Bull. n.15. f.5. 1892.

Stems very slender. Flowers glabrous, about 2 mm. long, pentamerous, subtended by one to three denticulate, ovate-lanceolate, acute bracts, one to several in scattered glomerules; calyx lobes orbicular, obtuse, denticulate, deeply divided, overlapping, enclos-

ing the corolla tube; corolla campanulate, becoming urceolate in fruit; lobes ovate, oval or slightly oblong, somewhat overlapping, about equalling the tube, spreading to reflexed; scales denticulate, about reaching the anthers, oblong-ovate, bridged at about the middle; anthers oval, shorter than the corolla lobes; about equalling the filaments; styles shorter than the small conic ovary; stigmas small. Capsule globose, conic, bearing the withered corolla at the apex, mostly one- or infrequently two-seeded; seed about 1 mm. long, light brown, globose-ovoid; hilum small. The embryo is thickened into a large round knob at the plumule? end.

Type locality: St. George, Utah. Range:- Southern Utah, Nevada and California.

Specimens examined:- Utah: St. George (Parry 205, the type, in the Engelmann herb.): Nevada: Esmeralda Co. (Shockley 443); Reno (Curran in 1888; Hillman in 1891); Pyramid Lake (Curran in 1883; without indication of collector, in 1883): California: The Needles (Jones in 1884; Rose 12074); San Bernardino Mts. (Parish 3230; 3231; 3236); Mojave Desert, Tehachapi Pass (Abrams & McGregor 505), Palmdale (Abrams & McGregor 523); San Diego Co. (Orcutt in 1889); Barstow (Brandegee in 1909); Ravena (Brandegee); San Bernardino Co. (Parish 2436).

47. Cuscuta Veatchii Brandegee.

C. Veatchii Brandegee, Proc. Calif. Acad. Sci. II. 2:189. 1889.

Stems medium to slender. Flowers glabrous, about 2 mm. long, pentamerous, on pedicels shorter than the flowers, single or in clusters of two to five, forming small lateral umbels; calyx membranous, longer than the corolla tube; lobes ovate-deltoid, overlapping, acute, denticulate; corolla campanulate; lobes ovate and acute to

lanceolate and acuminate, edges denticulate, as long as the tube, slightly overlapping, spreading; scales thin, rather difficult to study, reaching the filaments or infrequently shorter, fringed with medium length processes, bridged at about the middle; stamens on filaments shorter than or equalling the oval anthers; styles about as long as the globose-ovoid ovary; stigmas capitate. Capsule globose-ovoid, carrying the withered corolla at the apex; seeds, usually but one in each capsule, roundish, light brown, pitted?; hilum terminal. The embryo is enlarged at the plumule? end into a large round knob, as in C. denticulata.

This species is in many respects similar to C. denticulata, but differs in its more deltoid calyx lobes and in the flowers being somewhat pedicellate. (Rare and exceptional specimens of C. denticulata are also somewhat pedicellate).

Cuscuta Veatchii typica.

Corolla lobes deltoid-ovate, acute; anthers oval, on short filaments; scales ordinarily about reaching the filaments.

Type locality:- Lower California: Ubi. Range:- From southern California to Lower California.

Specimens examined:- California: The Needles (Jones 3862): Mexico: Lower California, Santa Maria (Brandegee in 1889), Ubi (Brandegee in 1889, the type, in Univ. Calif. herb. as sheet 105,066), San Requis (Brandegee in 1889).

Cuscuta Veatchii apoda n.var.

Corolla lobes lanceolate, acuminate, slightly longer than the tube; scales shorter than the tube; anthers oval-oblong, sessile.

Type locality:- Las Vegas, Nevada. Range:- Nevada.

Specimens examined:- Nevada: Las Vegas (Goodding 2296, the type, in the Univ. Calif. herb; Wooton in 1916; Brandegee in 1915);

Sodaville (Brandegee in 1913).

48. Cuscuta subinclusa Durand & Hilgard.

C. subinclusa Durand & Hilgard, Journ. Acad. Nat. Sci. Phil. II. 3: 42. 1855.--Engelmann, Trans. Acad. Sci. St. Louis 1:500.1859.

?C. Ceanothi Behr, Proc. Calif. Acad. Nat. Sci. 1:17. 1854.

Stems medium, somewhat fleshy in some specimens. Flowers about 5-6 mm. long, pentamerous, sessile or on pedicels shorter than the flowers in few to several flowered clusters which may be either scattered or approximated into dense continuous masses; calyx not reaching, or surpassing the middle of the corolla tube; lobes broadly ovate to lanceolate, acute, sometimes cuspidate, overlapping, somewhat loose about the corolla; corolla cylindrical, usually showing cross wrinkles or striations, slightly fleshy, the cells somewhat lens shaped causing the edges of the lobes to be crenulate; lobes slightly overlapping, ovate, acute, erect to spreading, much shorter than the tube; scales oblong, about half as long as the tube, fringed with short processes, bridged at about one-third of their height; anthers oblong, subsessile to sessile; styles slender, much longer than the subglobose ovary; stigmas capitate. Capsule oval, pointed, thickened in the form of a collar about the intrastylar aperture, capped by the withered corolla; seeds about 1.8 mm. long, usually but one in each capsule, globose, slightly compressed, yellow brown; hilum situated at the broader end in a depression, short, oblong, oblique.

Type location:- Tejon Pass, California. Type not seen.

Range:- Pacific coast states, from Oregon to Mexico.

Specimens examined:- Valley of Palms (Jones 3712): California: (Bolander 2674; 2436; 2698; 2849; 6381; Lemmon in 1878; Brewer 68; 1292; Bridges; Bioletti in 1892; Wright in 1853-56; Rattan

293; Newberry); Mt. Tamalpais (Jepson in 1892; Chesnut in 1887); Cuyamaca (Hitchcock in 1915); Santa Cruz Mts. (Hitchcock 205); Sequoia Nat. Park (Copeland 73); Owen's Valley (Horn in 1863; 2849); Claremont (Baker 3954); San Bernardino Co. (Pringle 145); San Bernardino Valley (Parish 5533); San Bernardino (Parish 3958; 539); Napa Co. (Chandler 7123; 7124); Nevada Co. (Jones 2490); Lake Co.(Bolander 2674); Los Angeles Co. (Brewer 68), Sherman (Braunton in 1902), Redondo (Braunton in 1902), Los Angeles (Hasse in 1890); Santa Clara Co. (Baker 57); Sierra Co. (Brewer 2698); Quincy (Eggleston 7649); Lassen's Peak (Austin 492); Contra Costa Co. (Bolander 2436); Modoc Co. (Manning 497; 498); Lathrop (Bioletti in 1892); San Joaquin River Bridge (Brandegee); Ramona (Brandegee in 1894); Tulare Co. (Engelmann in 1880; Congdon 69); Old Colony Mill (Brandegee in 1905); Visalia (Congdon in 1881); Placer Co. (Carpenter in 1892); Mendocino Co. (Vasey in 1875); San Jacinto Mts. (Hall in 1901); Yosemite Park (Hall 9675, with exceptionally large flowers); Nevada Falls (Redfield 5859); Placerville (Remey in 1855); Mare Island Bay (Wright in 1875); Napa Valley (Greene 335); Black Rock Mts. (Leiberg 5268); Butte Co. (Heller 11588); Madera Co. (Murdoc 2537); Mariposa Co. (Congdon in 1903): Oregon: Lakeview (Coville & Leiberg 150): Mexico: Lower California (Fish in 1882), Todos Santos (Fish in 1883).

49. Cuscuta salina Engelmann.

C. salina Engelmann in Brewer, Watson & Gray, Bot. of Calif. Geol. Survey Publ. 1:536. 1880.

Stems very slender. Flowers glabrous, about 2.5-4.5 mm. long, pentamerous, on pedicels mostly shorter than the flowers in cymose clusters; calyx lobes ovate to somewhat lanceolate, acute to acuminate, as long as the corolla tube; corolla campanulate, shallow or somewhat cylindrical; lobes as long as the tube, ovate to lanceol-

ate, acute to acuminate, upright, sometimes spreading; edges of the lobes frequently somewhat uneven, more or less overlapping; scales narrow, oblong, shorter than the tube, fringed with short processes, closely attached to the tube for nearly their entire length, sometimes with only the attachment to the filament fringed, bridged somewhat below the middle, or the scales reduced to small wings; anthers oval, on equal or shorter subulate filaments; styles slightly subulate, shorter than or equalling the globose, pointed ovary. Capsule globose, pointed, usually one-seeded, surrounded by the withered corolla; seeds about 1.5 mm. long, globose-ovoid, rostrate; hilum short oval, transverse.

Cuscuta salina squamigera (Engelmann) n. comb.

C. californica squamigera Engelmann, Trans. Acad. Sci. St. Louis 1:499. 1859.

C. subinclusa abbreviata Engelmann, ibid. 500. 1859.

C. squamigera (Engelmann) Piper, Contrib. U.S. Nat. Herb.11:455.1906.

Flowers relatively small, more narrowly campanulate than in the following variety; corolla slightly fleshy, the cells somewhat lens shape; lobes of the calyx and corolla ovate-lanceolate, acute.

Type locality:- Rio Virgen, Utah. Range:- British Columbia to Lower California, mostly on saline herbs.

Specimens examined:- Canada: British Columbia, Vancouver Island (Macoun 85812; 85818): Washington: San Juan Islands (Zeller 1129): Utah: Washington (Jones in 1880); St. George (Jones in 1880); Rio Virgen (Remy in 1855, the type, a fragment in the Engelmann herb.); southern Utah (Parry 206): California: (Lemmon in 1878); San Jacinto Valley (Vasey 436); Santa Barbara (Rothrock 101); San Bernardino Co. (Parish 2174; 6012); San Diego (Abrams 4015; Collins & Kempton 328);

Long Beach (McClatchie in 1896); Vallejo (Greene 327); Santa Cruz (Jones in 1901; 2316); Oxnard (Burtt Davy 7831½): Mexico: Tepic, San Blas (Maltby 21?, fragmentary).

Cuscuta salina major n. var.

Flowers larger than in the last, broadly campanulate; corolla lobes broadly ovate, acute, overlapping, spreading. The two varieties are closely united by intermediate forms.

Type locality:- Palo Alto, California. Range:- British Columbia to Lower California mostly on saline herbs.

Specimens examined:- Canada: British Columbia, Crescent (Henry 4912; 4913); Vancouver Island, Victoria (Pineo; Macoun in 1887): Oregon: Along coast (House 4683): Washington: (Stevens in 1853); Port Angeles (Foster 1863); Union City (Piper 715); Westport (Cowles 520); Seattle (Zeller in 1910): California: (Kellog & Harford 779); San Francisco Bay (Hall 5721); Palo Alto (Baker 41, the type, in the N.Y. Bot. Gard. herb.); Mendocino Co. (McMurphy 54); Santa Clara Co. (Elmer 1757); San Francisco (Bolander 2491); Bucksport (Tracy 3551); Mariposa (Congdon in 1901); Eureka (Hitchcock in 1915); Santa Cruz Mts. (Hitchcock 188); Humboldt Bay (Tracy 1356); San Diego (Brandegee; Berg in 1904); Head of San Joaquin Valley (Burtt Davy 1966); San Mateo Co. (Abrams in 1906); Coronado (Berg in 1904); West Berkeley (Michener & Bioletti in 1891; Burtt Davy in 1896; King in 1894); Los Angeles Co. (Chandler 2043); San Diego Co. (Parish 2281); Oakland (Congdon in 1904).

Cuscuta salina acuminata n. var.

Perianth divisions lanceolate, acuminate. Scales apparently nearly absent or reduced to a very few lateral projections.

Type location:- On an island of a mountain lake, Skamania Co., Washington.

Specimens examined:- Washington: Skamania Co., on an island of a mountain lake (Suksdorf 1487, the type, in the U.S. Nat. Herb. as sheet 49,803); California: southeastern part (Purpus 5378).

Subsection Lepidanche Engelmann.

Cuscuta §Lepidanche Engelmann, Trans. Acad. Sci. St. Louis 1:509.1859.

Flowers pedicelled or sessile in compact clusters; calyx lobes free, surrounded by subtending bracts.

Key to the species.

Flowers pedicelled, loosely paniculate, bracts numerous or few in the inflorescence, usually at least one subtending each flower - - 50. C. cuspidata.

Flowers sessile in more or less dense clusters.

Bracts acute, closely appressed - - - - - - 51. C. squamata.

Bracts acute, squarrose - - - - - - - - - - 52. C. glomerata.

Bracts obtuse, closely appressed - - - - - - 53. C. compacta.

50. Cuscuta cuspidata Engelmann.

C. cuspidata Engelmann, Bost. Journ. Nat. Hist. 5:224. 1847; and in Trans. Acad. Sci. St. Louis 1:502. 1859.--Matthew, Bull. Torr. Bot. Club. 20. pl.165. f.8. 1893.--Britton & Brown, Illustr. Flora 3:30. f.2965. 1898; 2 ed. 3:51. f.3451. 1913.

Stems medium flowers glabrous, about 4 mm. long, pentamerous, membranous, pedicelled or subsessile in loose or dense panicled clusters, the whole inflorescence more or less bracteate; calyx of distinct or very slightly united segments, surrounded by one or two ovate, orbicular, obtuse, sometimes cuspidate bracts, sepals of similar shape, obtuse or cuspidate, somewhat glandular thickened along the median portion and with the edges more or less serrulate; corolla funnel shape; lobes oblong, shorter than the tube, obtuse or with a mucronate or cuspidate tip, usually with a row of glandular

cells along the median portion; scales oblong, shorter than the tube or reaching the filaments, fringed with medium length processes, bridged at about the middle; styles slender and much longer than the globose-oblong or slightly conic ovary; stamens shorter than the lobes; anthers oval, somewhat cordate, slightly versatile, usually shorter than the filaments. Capsule globose, with a slightly thickened ridge or collar about the intrastylar aperture, frequently with numerous glandular cells, carrying the withered corolla at the apex; seeds about 1.4 mm. long, olive brown, slightly obovate, compressed or angular; hilum short, oblong or oval, oblique or nearly transverse.

This species shows considerable range in the number of bracts: some specimens are scarcely bracteate while others are very much so.

Type locality:-"Dry prairies west of the Brazos". Range:- Mostly in the prairie states; from Illinois westward to Utah and Colorado and southward to Texas and Louisiana.

Specimens examined:- Lat. 41° (Hall & Harbour 404): Connecticut: New Haven (Eaton, ex Herb. Thurber in Herb. G.V. Nash. Seems typical, but probably not collected in Conn.): Illinois: St. Clair Co. (Eggert in 1878; in 1891); Mascoutah (Welsch); Cahokia (Eggert in 1874): S. Dakota: Brookings Co. (Johnson in 1903): Nebraska: Valentine (Bates in 1895); Grant Co. (Rydberg 1639); Lincoln (Hannah in 1916); Nichols Co. (Hedgcock in 1889); Sand Hills of the Platte (Hayden in 1853-54): Iowa: Muscatine (Reppert in 1895): Kansas: Finney Co. (Hitchcock 359); Manhattan (Carleton in 1892); Tankton (without indication of collector, in 1892); Meade (Smyth 80a,c,e,f,g,i,k,); Rockport (Bartholomew in 1889); Miami Co. (Oyster 5953); Bourbon Co. (Hall in 1867): Missouri: St. Louis (Eggert in 1891); Willard (Standley 9700; Blankinship in 1889 and in 1892); Malden (Bush in 1893);

Kansas City (Bush 414); Campbell (Bush in 1893); Pacific (Thompson in 1898); Iron Co. (Russell in 1897): Oklahoma (DeBarr 460); Pottawatomie Co. (White in 1900): Indian Territory: (Butler in 1875); Sapulpa (Bush 388; 1359): Louisiana: Lake Charles (Mackenzie 543): New Mexico: Arkansas River (Fendler 659b): Texas: (Lindheimer 277); Victoria (Thurber 2); Dallas (Reverchon 664; 2194); Fort Smith to the Rio Grande (Bigelow 3, and in 1853-54); Polytechnic (Ruth 317); Randall Co. (Ball 1261); Moore Co. (Carleton 421); Austin Co. (Wurzlaw); Fort Worth (Reverchon 3202); Columbia (Bush 932); Brazoria Co. (Palmer 6684); On the Blanco (Wright in 1847); west of the Brazos (Lindheimer 125, taken as the type, in the Engelmann herb.); Between San Antonio & Victoria (Schott); Wilburger Co. (Eggert): Colorado: (Parry 273): Utah: Ogden Hot Springs (Ries in 1893); North Ogden (Hillman):

51. Cuscuta squamata Engelmann.

C. squamata Engelmann, Trans. Acad. Sci. St. Louis 1:510. 1859.

Stems slender. Flowers glabrous, pentamerous, sessile few to several in separate or glomerate clusters, subtended by 2-10 ovate, acute, serrulate, sometimes cuspidate, closely appressed bracts that are shorter than the calyx; calyx lobes distinct, ovate, acute, cuspidate, closely appressed, somewhat serrulate, equalling the corolla tube, in appearance much like the bracts; corolla cylindrical; lobes ovate, lanceolate, acute, sometimes somewhat cuspidate, spreading or reflexed; scales about reaching the filaments, oblong, their processes of medium length and numerous, bridged at about the middle; stamens shorter than the lobes; filaments as long as or shorter than the oblong, oval anthers; ovary globose to slightly conic, somewhat two pointed; styles longer than the ovary; stigmas

capitate. Capsule globose, slightly conical to pointed by the thickened apex, somewhat glandular on the upper portion, carrying the withered corolla at its apex; seeds about 1.5 mm. long, slightly oblique, one or infrequently two in a capsule, globose or compressed, brown, roughened; hilum short, linear, oblique.

Type locality:- "Fields and wastes on the Rio Grande." Range:- Texas, New Mexico and northern Mexico.

Specimens examined:- New Mexico: (Wright 1628); Dona Ana Co. (Wooton in 1899 and in 1902; Standley 6370; 426 and in 1906; Standley & Wooton 336 and an unumbered collection in 1907 and in 1906); Chaves Co. (Earle & Earle 289): Texas: El Paso (Wright 1628; 518, taken as the type, in the Engelmann herb; 392; Bigelow in 1852; Thurber 818; Jones 4170; in 1884; Stearns 455); Presidio Valley (Havard in 1881 and in 1883): Mexico: State of Chihuahua (Pringle 785), Presidio del Norte (Parry in 1852).

52. Cuscuta glomerata Choisy.

C. glomerata Choisy, Mém. Soc. Phys. et Hist. Nat. Genève 9:280. pl. 4. f.1. 1841; and in DC., Prodromus 9:458. 1845.--Engelmann, Trans. Acad. Sci. St. Louis 1:510. 1859.--Matthew, Bull.Torr. Bot. Club 20. pl. 165. f.12. 1893.--Britton & Brown, Illustr. Flora 3:31. f.2967. 1898; 2 ed. 3:52. f.3453. 1913.

C. aphylla Rafinesque, Amer. Monthly Mag. & Crit. Rev. 4:40.1818.non Loureiro 1790.

?C. paradoxa Rafinesque, Annals of Nature 1:13. 1820.

C. americana Hooker, Comp. to the Bot. Mag. 1:173. 1835.

Lepidanche compositarum Engelmann, Amer. Journ. Sci. & Arts 43:344. pl. 6. f.30-35. 1842.

Stems medium, disappearing early from between the dense straw-colored rope-like floral masses which are wound tightly about

the stem of the host. Flowers glabrous, 4-5 mm. long, pentamerous, sessile, mostly endogenously formed, breaking forth in two parallel rows on opposite sides of the stem, much imbricated with numerous, scarious, lacerated, cupped, oblong, obtuse to acutish bracts with recurved tips; sepals distinct, oblong-oval, obtuse to acutish, their tips somewhat spreading but not recurved, otherwise similar to the bracts; corolla cylindrical; lobes spreading or sometimes reflexed, oblong to lanceolate, obtuse or acutish, sometimes mucronate, usually with a row of glandular cells along the mid portion, shorter than the corolla tube; scales shorter than the tube, oblong, more profusely fringed at the apex than along the sides, bridged at about the middle or above; stamens shorter than the corolla lobes; anthers elliptical to oblong, about as long as or shorter than the filaments; styles capillary, longer than the somewhat flask shaped ovary. Capsule globose-pointed or flask-shaped with the withered corolla carried at its apex; seeds about 1.7 mm. long, oval, globose, slightly compressed, light brown, one or infrequently two in the capsule, or this not infrequently sterile; hilum oblong, oval, transverse.

This is undoubtedly the plant referred to by Rafinesque and named C. aphylla by him. His name would be valid were it not that Loureiro in 1790 used aphylla to designate another plant of this group. It is rather doubtful if the plant described by Rafinesque as C. paradoxa is the same as this one.

Type location:- "Hab. prope St. Louis in Missouri." Range:- Throughout the prairie states from Indiana and Michigan westward to S. Dakota and Nebraska and southward to Mississippi and Texas.

Specimens examined:- Michigan: Berrien Co. (Pepoon 936); Cass Co. (Pepoon 300): Indiana: Whiting (Chase 422); New Albany (Clapp); Lake Maxinkuckee (Clark in 1909): Tennessee: Henderson

(Bain in 1892); Dickson Co. (Gattinger in 1886); Chester Co. (Bain 331): Illinois: Winnebago Co. (Bebb in 1859); Naperville (Umbach in 1896); Mt. Carmel (Schneck in 1877); Herod (Clinton 28756); Ringwood (Vasey); Thornton (without indication of collector, in 1865); Henderson Co., Oquawka (Patterson); Aurora (Boyce in 1883); Ravinia (Sherff in 1911); Fountaindale (Bebb in 1872); Alton (Douglass in 1891); Iroquois Co. (Moffatt 526); Riverside (Greenman in 1912); So. Chicago (Sherff 1755); Glencoe (Greenman 2881); St. Clair Co. (Eggert in 1875): Wisconsin: Walworth Co. (Shannon 127): Minnessota: Morton (McMillan in 1890); Zumbrota (Ballard in 1892): S. Dakota: Clay Co. (Over 5131); Yankton (Dean in 1861): Nebraska: (Hayden in 1853); Weeping Water (Williams 40); Newark (Hopeman in 1893); Ashland (Williams in 1889); Nicholls Co. (Hedgcock in 1899); Holt Co., Turkey Creek (Clements 2819); Lincoln (Hannah in 1916): Iowa: Decatur Co. (Fitzpatrick in 1897); Ames (Pammel & Ball 79; Hitchcock in 1888); Spirit Lake (Cratty in 1901): Missouri: Willard (Blankinship in 1887); Kirksville (Sheldon in 1884); Webb City (Palmer 818; 3069); Lawrence (Blankinship in 1895); Desoto (Hasse in 1887); St. Louis (Engelmann 417; in 1841; in 1864; Eggert in 1880; Craig in 1911; Riehl 15, taken as the type, a specimen with the type number in the Engelmann herb; 16 also cited by Choisy with the type); Springfield (Weller 66; Standley in 1905; 9156; 8456); Prosperity (Palmer 3861); Jasper Co. (Bush in 1893); Green Co. (Blankinship in 1889); Jackson Co. (Bush in 1893); Joplin (Palmer 3129): Kansas: Riley Co. (Norton 360); Manhattan (without indication of collector or date; Kellerman in 1890); Lawrence (Stevens); Wichita (Smyth 250b; 250c); Pawnee Fork of Ark. river (Fendler 657); Pottawatomie Co., St. George (Kellerman in 1890): Mississippi: Oktibbeha Co. (Pollard 1280); Harman Lake (Tracy 1649): Indian Territory: (Sheldon 263;

Baker in 1875; Butler 13); Sapulpa (Bush 389); Limestone Gap (Butler 11335): Texas: (Lindheimer 10); Commanche Spring (Lindheimer 1028); Llano (Lindheimer in 1847); Fort Smith to Rio Grande (Bigelow 5); Dallas Co. (Reverchon 1686); Gillespie Co. (Williams 753).

53. Cuscuta compacta Jussieu.

C. compacta Jussieu in Choisy, Mém. Soc. Phys. et Hist. Nat. Genève 9:281. pl. 4. f.2. 1841; and in DC., Prodromus 9:458. 1845.--Engelmann, Trans. Acad. Sci. St. Louis 1:511. 1859.--Matthew, Bull. Torr. Bot. Club 20. pl. 165. f.11. 1893.-- Britton & Brown, Illustr. Flora 3:71. f.2966. 1898; 2 ed. 3:52. f.3452. 1913.

Stems coarse. Flowers glabrous, 4-5 mm. long, pentamerous (infrequently tri- or tetramerous), sessile, in compact clusters about the host or somewhat more loose; sepals distinct, orbicular to oval, cupped, sometimes fringed with short, slender filamentous processes, surrounded by 3-5 similar, appressed bracts; cells of the bracts and sepals with heavily thickened walls; corolla tube cylindrical, becoming urceolate in fruit; lobes spreading to reflexed, oblong, obtuse, infrequently fringed with short filamentous processes, much shorter than the tube; scales shorter than the tube or reaching the filaments, fringed with long processes, bridged at about the middle, small scales frequently appearing on the bridge between the larger ones, or the scales much reduced; stamens shorter than the lobes; anthers oval, about equal to or longer than the short thick filaments; ovary globose, conical thickened at the apex. Capsule globose-conic, slightly pointed, glandular about the apex which carries the withered corolla; seeds about 2.6 mm. long, globose, ovate, angled or flattened on one side, scurfy; hilum oblong, oblique.

about the middle, small scales frequently appearing on the bridge between the larger ones, or the scales much reduced; stamens shorter than the lobes; anthers oval, about equal to or longer than the short thick filaments; ovary globose, conical thickened at the apex. Capsule globose-conic, slightly pointed, glandular about the apex which carries the withered corolla; seeds about 2.6 mm. long, globose, ovate, angled or flattened on one side, scurfy; hilum oblong, oblique.

Cuscuta compacta adpressa Engelmann.

C. compacta adpressa Engelmann, Trans. Acad. Sci. St. Louis 1:511. 1859.

Lepidanche adpressa Engelmann, Amer. Journ. Sci. & Arts 45:77. 1843.

Corolla nearly enclosed in the calyx or somewhat exserted; scales well developed. The common form.

Type locality:- Near St. Louis, Missouri. Range:- From New Hampshire, Connecticut and Massachusetts southward to Florida and westward through the central and southern states to Arkansas, Oklahoma and Texas.

Specimens examined:- Bush River Station (Shull 367): New Hampshire: Derry (Seaman): Massachusetts: Marion (Vail in 1888): Connecticut: New Haven (Eaton in 1858): New Jersey: Ocean Co. (Mckenzie 2908; Redfield 5851 and in 1874); West New York (VanSickle in 1894); Landisville (Gross 2193); Atsion (Allen in 1879); Merchantsville (Redfield 5845); Pine Barrens (Canby 2): District of Columbia: Takoma Park (Chase 2571); Washington (Holm in 1888; Steele in 1896 and in 1902; Blanchard in 1891): Maryland: Salisbury (Tidestrom 7446); Hyatteville (Steele in 1904): Virginia: Franklin (Heller 1166); Carlins (Dewey 37); southeast Va. (Kearney 2365); Alexandria (Shull 204; 367): N. Carolina: Jackson Co. (Ashe); Elizabeth City (Boettcher 293); Buncombe Co. (Gray & Sullivant in

1863); Swain Co. (Beardslee & Kofoid in 1891): S. Carolina: Aiken (Ravenel in 1874): Tennessee: Cocke Co. (Kearney 844; 845); Tullohoma (Gattinger in 1886); Jackson (Bain 438); Green Co. (Redfield 5852); Hiawassee (Ruth in 1895); McFarland (Ruth in 1893); Hollow Rock (Eggert in 1897): Kentucky: Edmunson Co. (Price in 1897): Alabama: Mobile (Mohr in 1896); Cullman (Eggert in 1897 and in 1898): Florida: (Chapman); Apalachicola (without indication of collector; Herb. Chapman 3735b); Duval Co. (Curtiss 2193); Jacksonville (Curtiss 5328); St. Vincent Island (McAtee 1807a); Tallahassee (Berg); Lake City (Rolfs 508; 510): Georgia: (Beyrich, the type of C. coronata, a fragment in the Engelmann herb.); Stone Mt. (Hitchcock in 1905); Walton Co. (Small in 1894); Habersham Co. (Small in 1893): Louisiana: Alden Bridge (Trelease in 1898); Shrevesport (Gregg in 1847): Mississippi: Between Gulf Port & Long Beach (Joor in 1891): Illinois: E. Carondelet (Eggert in 1891); Mt. Carmel (Schneck in 1887); Opposite St. Louis (Engelmann in 1845); Peoria (Brendel): Missouri: St. Louis (Eggert in 1891; Engelmann in 1842, the type, in the Engelmann herb.); Allenton (Letterman in 1879); Howell Co. (Bush in 1892); Carter Co. (Trelease 477); Monteer Co. (Bush 371; 218; 5143); Scott Co. (Eggert in 1894): Arkansas: Hot Springs (Palmer 8476; Letterman; Trelease in 1898); Hempstead Co. (Palmer 6840); Magnet Cove (Trelease in 1897); Howard Co. (Kellogg in 1909): Oklahoma: (Page 2641); Leflore Co. (Stevens 2641): Indian Territory: Cherokee Nation (Blankinship in 1895): Texas: (Wright; Thuron in 1890); Dallas (Reverchon 3201); Sheldon (Reverchon 3883).

Cuscuta compacta efimbriata n. var.

Tube much exserted; scales shorter than the tube and much reduced, bifid or winged and with few processes.

Type locality: Duval Co., Florida.

Specimens examined: Florida, Duval Co. (Fredholm 305, the type, in the U.S. Nat. Herb. as sheet 214,815).

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IV Plates.

Plate 1.

Fig. 1. - C. Coryli (Flower).
" 2. - " (Capsule).
" 3. - C. Cephalanthi (Flower).
" 4. - " (Capsule).
" 5. - C. epilinum.
" 6. - C. Veatchii.
" 7. - C. erosa.
" 8. - C. exaltata (Flower).
" 9. - " (Capsule).

Fig. 10. - C. planiflora
" 11. - C. jalapensis (Caps)
" 12. - " (Flr.)
" 13. - C. desmouliniana
" 14. - C. applanata.
" 15. - C. chapalana.
" 16. - C. rugosiceps.
" 17. - C.mitraeformis (Cap.)
" 18. - C. certaophora.

Plate 2.

Fig. 1. - C. subinclusa.
" 2. - C. californica graciliflora.
" 3. - C. californica brachycalyx.
" 4. - C. californica papillosa.
" 5. - C. californica breviflora.
" 6. - C tuberculata.
" 7. - C. tinctoria.
" 8. - C. choisiana.
" 9. - C. gracillima saccharata.
" 10. - C. gracillima subtilis.
" 11. - C. denticulata
" 12. - C. californica graciliflora

Fig.13.- C. europaea (Caps.)
" 14.- C. epithymum.
" 15.- C. potosina globifera
" 16.- C. potosina typica
" 17.- C. salina acuminata
" 18.- C. Purpusii.
" 19.- C. leptantha Palmeri
" 20.- C. polyanthemos.
" 21.- C. decipiens.
" 22.- C. racemosa chiliana
" 23.- C. decipiens
" 24.- C. indecora pulcherrima.

Fig. 25.- C. indecora longisepala.

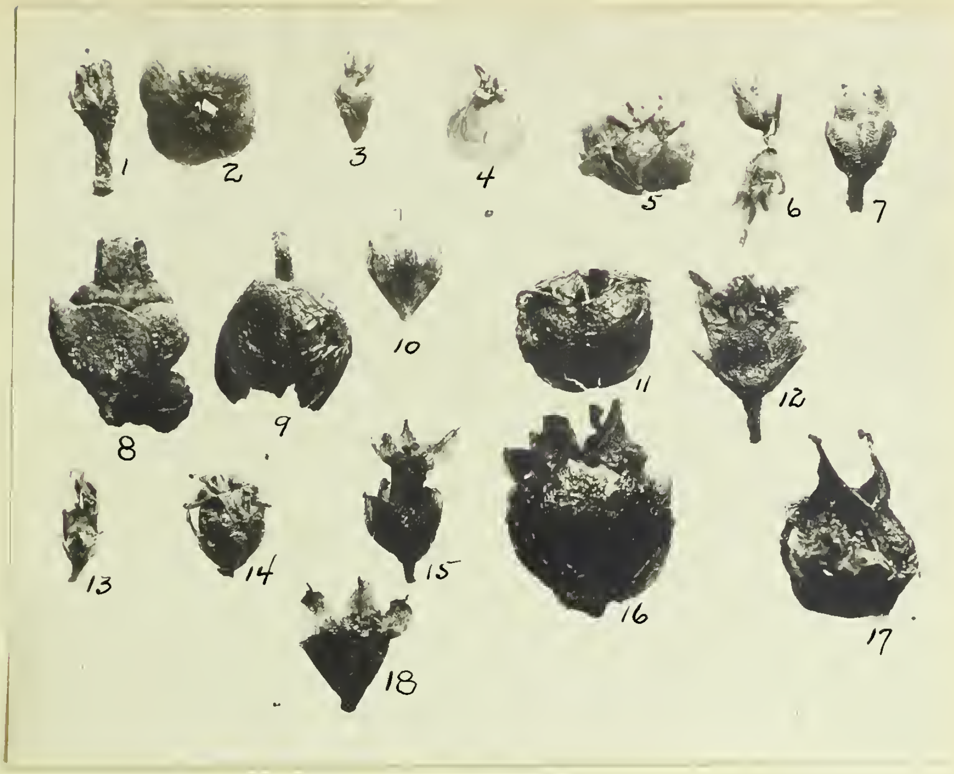

Plate 1.

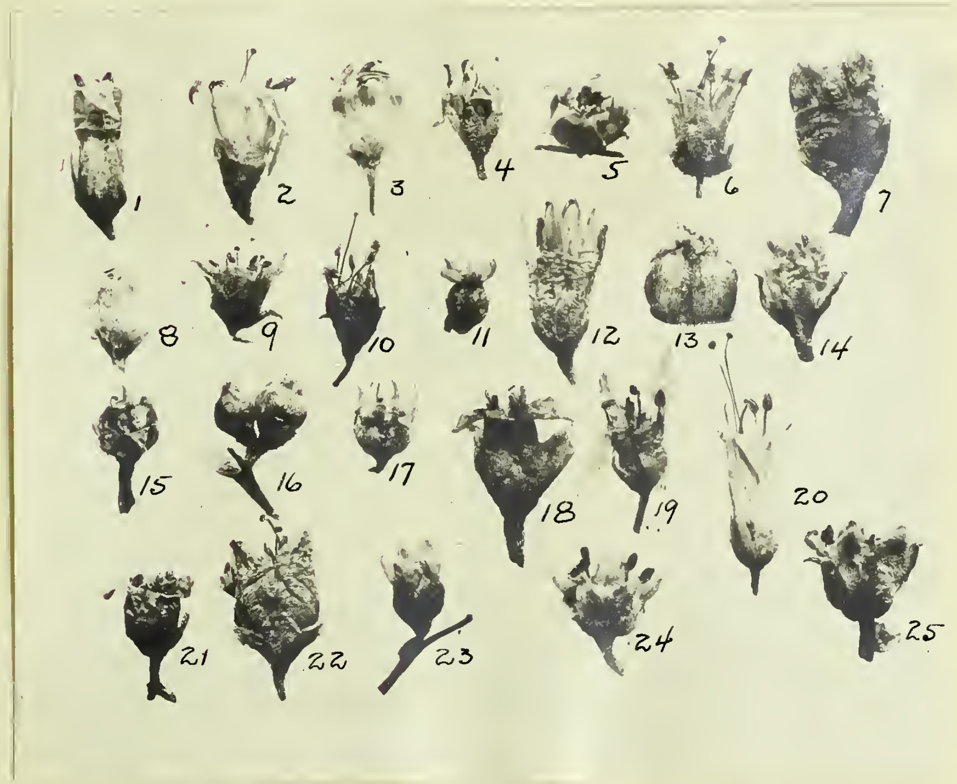

Plate 2.

Plate 3.

Fig. 1.- C. curta (Flower).
" 2.- " (Capsule).
" 3.- C.Gronovii (Flower).
" 4.- " (Capsule).
" 5.- C.rostrata (Flower).
" 6.- " (Capsule).
" 7.- C.corymbosa grandiflora.
" 8.- C. cuspidata.
" 9.- C. compacta.
" 10.- C. polygonorum (Capsule).
" 11.- C. macrocephala.
" 12.- C. americana congesta..
" 13.- C. corymbosa stylosa.
" 14.- C. salina reflexa.

Fig. 15.-C.arvensis verrucosa.
".. 16.- " microcalyx.
" 17.- " calycina.
" 18.-C. umbellata typica.
" 19.-C. odontolepis typica.
" 20.-C. squamata.
" 21.-C. partita.
" 22.-C. Pringlei.
" 23.-C. glomerata.
" 24.-C. salina ampliore.
" 25.-C. deltoidea.
" 26.-C. Harperi (Flower).
" 27.- " (Capsule).
" 28.-C. glandulosa.

29. C. salina squamigera.

Plate 4.

Fig. 1.-C. arvensis.
" 2.-C. indecora.
" 3.-C. planiflora.
" 4.-C. Coryli.
" 5.-C. compacta.
" 6.-C. applanata.
" 7.-C. epilinum.
" 8.-C. cuspidata.
" 9.-C. squamata.
" 10.-C. curta.
" 11.-C. glomerata.
" 12.-C. americana.
" 13.-C. rostrata.

Fig. 14.-C. salina.
" 15.-C. mitraeformis.
" 16.-C. Cephalanthi.
" 17.-C. glandulosa.
" 18.-C. europaea.
" 19.-C. epithymum.
" 20.-C. denticulata.
" 21.-C. subinclusa.
". 22.-C. Gronovii.
". 23.-C. umbellata.
" 24.-C. polygonorum.
" 25.-C. californica.
" 26.-C. partita.
" 27.-C. Pringlei.
" 28.-C. odontolepis.
" 29.-C. mitraeformis.
" 30.-C. rugosiceps

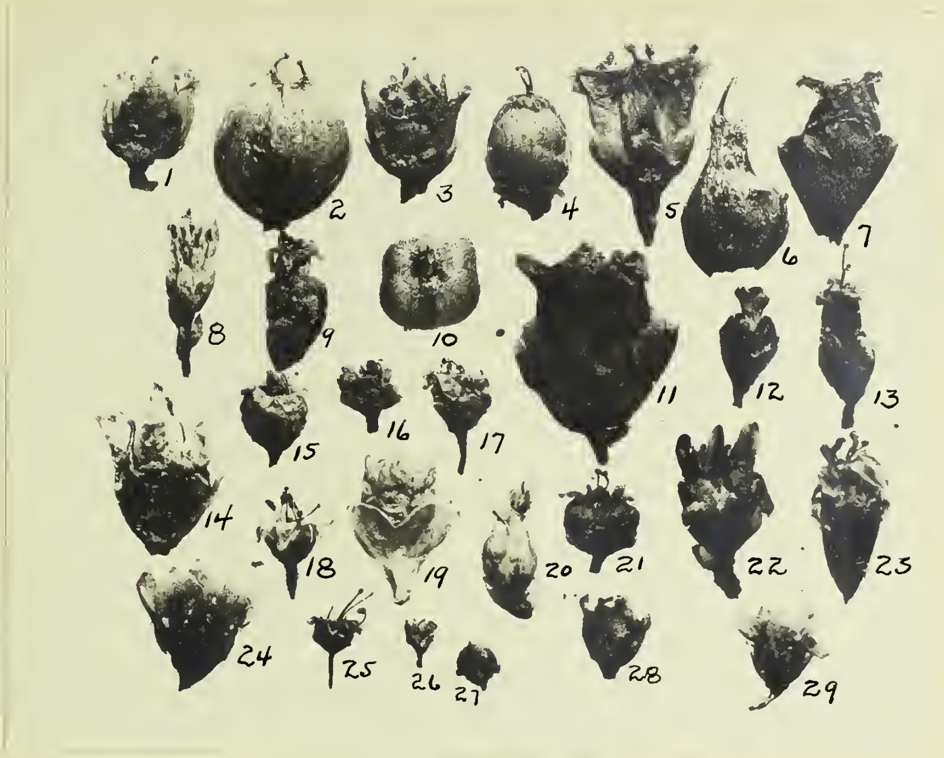

Plate 3.

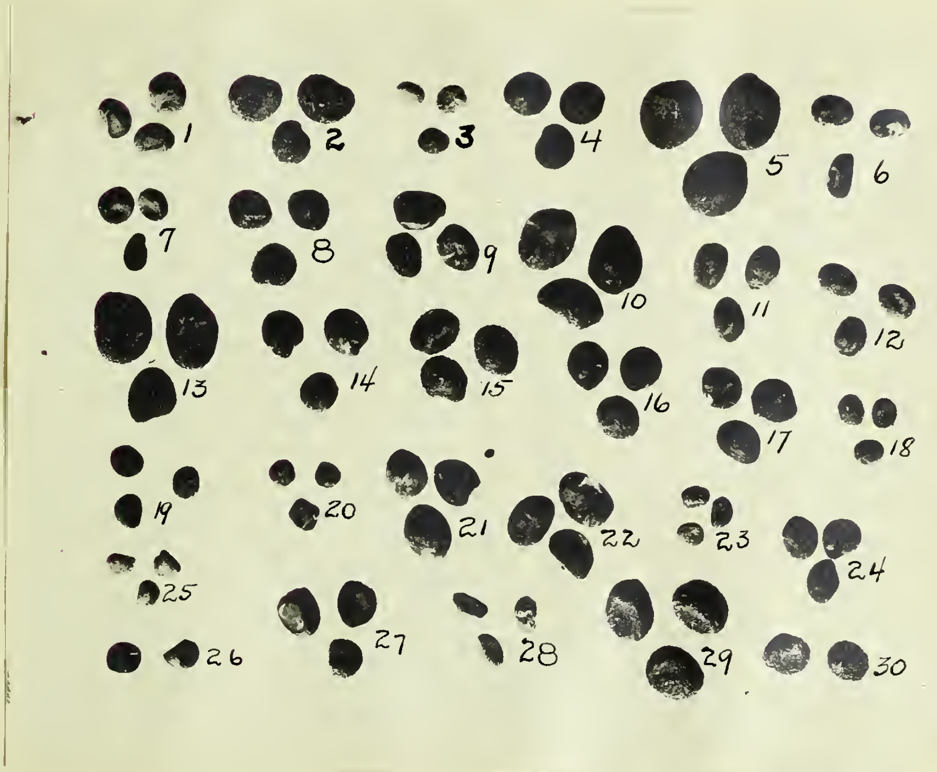

Plate 4.

V. Vita.

Truman George Yuncker was born March 20, 1891 at Carson City, Mich.

He attended the public schools of Ypsilanti, Michigan, completing the eighth grade.

He attended one year of High School at Carson City, Mich.

About one year was spent in the Lansing Business University specializing in stenography and general business courses.

Later he entered the Michigan Agricultural College graduating with the B.S. degree in 1914.

The following year, in 1915, he received the M.A. degree from the University of Nebraska.

The year 1915-1916 was spent teaching botany in the Manual Training High School at Indianapolis, Indiana.

In the fall of 1916 he entered the University of Illinois.

In March 1918 he entered the Medical Department of the U.S. Army and was stationed for the following ten months at the Army Medical School, Washington, D.C.

In January 1919 he re-entered the University of Illinois.

While at the University of Nebraska and for the first two years at the University of Illinois he acted as an assistant in botany.

Publication.

"A study of the relation of soil moisture to transpiration and photosynthesis in the corn plant." Plant World 19:151. 1916.